COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Professional Doctorate of Clinical Psychology

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This thesis is presented as partial fulfilment of the degree of
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I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any other tertiary education institution.

I acknowledge the participation and assistance of the Department of Corrective Services (WA) in the conduct of this research. This thesis and its contents cannot be considered as either endorsed by the Department or an expression of the policies or view of the Department of Corrective Services (WA). Any errors of omission or commission are the responsibility of the researcher.

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Raileen Antonia Merlino
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Abstract

There is clear evidence that drug and alcohol dependence is associated with neurocognitive impairments (Kiluk, Nich & Carroll, 2011; Krämer, Kopyciok, Richter, Rodriguez-Fornells & Münte, 2011; Sofuoglu, Sugarman & Carroll, 2010; Umut et al., 2016). This is pertinent to the rehabilitation of prisoners with a history of drug and/or alcohol dependence, which is prevalent in this population.

In this dissertation, two studies were conducted. Study 1 examined cognitive and executive functioning of 115 WA prisoners with a history of drug and alcohol dependence using a battery of neuropsychometric tests. As prior research has demonstrated that age of first use, number of substances used, frequency and total years of drug use may predict levels of neurocognitive impairments, these variables were factored in to understand if they predict performance on cognitive and executive measures. The prisoner group scored significantly lower than the normative population in the domains of attention, working memory, immediate interference susceptibility, cognitive flexibility, inhibition, abstract reasoning and problem solving. Moreover, 70% of prisoners scored within the clinically impaired range on a measure of speed of processing, and 29.6% of the sample also scored at a clinically impaired level on a measure of memory consolidation (the ability to convert information from short term memory into long-term memory).

Cognitive impairments have been linked with treatment outcomes, with research indicating that low self-efficacy has been associated with treatment outcome in previous literature (Adamson, Sellman & Frampton, 2009; Kelly & Greene, 2014; Randall et al., 2003). As Cognitive Behavioural Therapy is used in the rehabilitation of prisoners and has been shown to improve self-efficacy, Study 2 examined changes in self-reported self-efficacy before and
after the completion of a cognitive skills building program ‘Think First’ in a subsample of 52 participants taken from the original sample. Processing speed and memory consolidation were analysed to understand their predictive nature on prisoners’ self-reported self-efficacy, as they play a major role in learning, interpreting and applying new information. Results demonstrated that prisoners with neurocognitive impairments in the cognitive domains of processing speed and memory consolidation self-reported positive shifts in the following areas after engaging in a cognitive skills program: attitude towards offending, perception of problem solving ability and specifically social problem solving, perceived self-efficacy, cognitive decision-making ability without impulsivity, and ability to stop and think before acting out (motor impulsivity). Additionally, speed of processing was found to be a predictor of reported self-efficacy; with higher scores on measures of processing speed associated with higher scores in self-reported self-efficacy post intervention. However, memory consolidation (as measured by RAVLT) did not significantly predict self-efficacy.

Findings from this dissertation provide important information which can be utilized by Corrective Services to inform prisoner allocation into therapeutic and psychoeducational programs, in accordance with the Risk-Need-Responsivity principle. It also provides clinicians responsible for delivering such programs with an understanding of the level of cognitive function prevalent within this population and how this may be taken into account when tailoring future offender rehabilitation programs to better meet individuals’ needs, and maximize benefit to both prisoners and the wider community.
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Chapter 1: Understanding the Issues

Impact of Drug and Alcohol Use in Australian Prisons

A recent review conducted by the Office of the Inspector of Custodial Services indicated that there has been an increase in people returning to prison, with 40 to 45 percent of people (approximately 2000 people) re-entering Western Australian prisons within two years of release (AIHW, 2015; Hon Joe Francis MLA, Minister for Corrective Services, 2014). This has resulted in increased financial strain on prisons and the government, as well as increased harm to the wider community in terms of the number of victims.

In Australia, as of December 2016, there were approximately 39,568 people in prison, and approximately 64,977 people in the community sanctioned under a corrections community based order. Between December 2011 and December 2016, prisoners increased by 36% (10,494 persons), with Western Australia being the largest contributor (16% or 6,323 persons; ABS, 2016). Drug offences were among the most common offences, accounting for charges associated with approximately 12% of incarcerated prisoners (ABS, 2016). In WA, there is a higher prevalence of drug and alcohol use disorders in prisons than in the general population (ABS, 2016; Davidson et al., 2015). In 2013, 74% of female prisoners and 77% of male prisoners met the criteria for a drug and/or alcohol use disorder diagnosis, compared to 3.3% females and 7% of males in the community (Davidson et al., 2015).

Given the aforementioned findings, drug and alcohol use presents a serious and complex problem which contributes to social and family disruption, workplace concerns, overdose, death, substantial illness, community safety issues, violence and crime (Ministerial Council on Drug Strategy, 2011; AIHW, 2014). Drug and alcohol abuse is widely recognised in Australia as a major health concern which imposes a variety of broad economic, personal and health
related costs at an individual, community and societal level (AIHW, 2014). Examples of such burdens include, but are not limited to:

- social disruption to the community;
- mental illness including self-harm and suicide;
- ostracising by family and friends leading to isolation and homelessness;
- cognitive impairment affecting day to day activities and learning;
- self-inflicted injury and overdose;
- traffic accidents;
- lost workforce productivity; and
- incarceration due to criminal activity to support dependence


According to the National Drug Strategy 2016-2025 (Button, 2015), the leading survey of drug use in Australia, the cost to Australian society of alcohol, tobacco and other drug use in 2004-2005 was estimated at $55.2 billion. Of this, alcohol was the most common drug used across the Australian population, accounting for $31.5 billion (56.2%) whilst illegal drugs accounted for $8.2 billion (14.6%). In addition to financial cost, drug users reported high levels of psychological distress (17.5%) and 21% had been diagnosed with or treated for a mental illness. Data collected from the 2013 National Drug Strategy Household Survey from almost 24,000 people across Australia found 6.5% of people aged 14 or older consumed alcohol daily and almost 5 million Australians aged 14 and over (26%) reported being victims of alcohol-related incidents. 4.7% of people had misused pharmaceuticals; up to 50% of the population
had misused an illegal drug; whilst 0.4% to 1.2% had misused psychoactive drugs (AIHW, 2014).

Prisoners report higher rates of alcohol and drug use as well as mental health issues compared to the general population (AIHW, 2015; Button, 2004). Whilst limited information is available regarding alcohol and drug use specific to Western Australia, in the general prison population, use of drugs such as methamphetamines, cannabis and ecstasy is more common among younger prisoners between the ages of 18 to 24 years compared to those aged 45 years and over who often reported using heroin and alcohol (AIHW, 2015). Gender differences in drug use within prison populations have also been well documented, with women more likely than men to have used tranquillisers/sleeping pills and analgesics/painkillers (AIHW, 2015). Amongst prisoners who reported illicit drug use, poly drug use was common, that is, with more than 2–4 different types of drugs reported on average (AIHW, 2015; ABS, 2016; Sweeney & Payne, 2011). The most commonly reported illicit drugs used include methamphetamine (50% of prisoners), cannabis (41% of prisoners), followed by prescribed medication (i.e., analgesics (13% of prisoners), tranquillisers (11% of prisoners) then heroin (9% of prisoners) and ecstasy (7% of prisoners) (AIHW, 2015).

Substance and Alcohol Use

Drug dependence according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5: American Psychiatric Association, 2013) is classified as a substance use disorder, and refers to the abuse of, or dependence on, a drug that leads to effects that are detrimental to the individual’s mental and physical health, or the welfare of others. The DSM-5 addresses each specific substance as a separate disorder and identifies each of these as being associated with a set of psychological symptoms including: (1) a strong desire or sense of compulsion to take a substance; (2) difficulty controlling substance-taking behaviour; (3) neglect of other
pleasures and interests due to substance intake; (4) the continued pursuit and use of the substance despite clear evidence of harmful consequences, and physiological symptoms including tolerance to substance effects; and (5) withdrawal symptoms when substance use is discontinued, intense craving and compulsive seeking and taking of substances (American Psychiatric Association, 2013). Drug dependence has been found to be significantly associated with cognitive functioning, with individuals displaying mild to severe cognitive impairment (American Psychiatric Association, 2013). For example, a mild substance use disorder includes two to three symptoms, whereas a moderate level has four to five symptoms, and a severe level has six or more symptoms (American Psychiatric Association, 2013).

Poly drug dependence is often seen amongst offenders (AIHW, 2010; Horn et al., 2014; Sweeney & Payne, 2011), and can develop should an individual, according to DSM-IV criteria, use at least three different substances (not including caffeine or nicotine) indiscriminately, without having a preference or addiction to any single specific substance. Individuals are assessed as having poly drug dependence if they present with a minimum of three psychological symptoms over a period of 12 months (American Psychiatric Association, 2000). Increased risk of poly drug dependence is only one of several negative factors including poor physical and mental health, low education and low income likely to be experienced by WA prisoners (Furby & Kevin, 2008; Sweeney & Payne, 2011).

**Western Australian Prisoners and Rehabilitation**

A prisoner’s health is multifaceted, and can be affected by factors such as social support, quality of family and social friendships, socioeconomic status, and other socioeconomic characteristics such as education level and employment history. Poor outcomes associated with these factors (i.e. poor social support, small to no social networks, low socioeconomic status,
and poor employment outcomes) are more prevalent in the prison population when compared to the general community (AIHW, 2015).

Lower level of education is strongly associated with poor health (Mitrou et al., 2014) and drug use (Telfair & Shelton, 2012). On average, prisoners report lower levels of education compared to the general population (AIHW, 2013; Payne, 2007). According to recent data presented in The Health of Australia’s Prisoners 2015 (AIHW, 2015), In terms of the non-Aboriginal population, only up to 11% of prisoners aged 20-44 completed Year 12, compared to 36% of community members. 19-25% of the prison sample completed and exited at Year 10 or equivalent, compared to 6-11% for non-incarcerated members in the community. This indicates that non-Aboriginal individuals in the community between 20-44 years of age are more likely to complete Year 10 than their prison counterparts. Successful attainment of education is a protective factor that is strongly associated with positive wellbeing (Maralani, 2014). As such, lower levels of education can often affect an individual’s ability to form healthier lifestyle habits and healthy social networks (Maralani, 2014).

As stated above, offenders generally have lower levels of education when compared to their counterparts in the community. This makes understanding and improving the cognitive ability of prisoners of vital importance. Regardless of whether an offender is incarcerated or is in the community, one of the main aims of the Mission Statement of the Western Australian Department of Corrective Services is to ‘assist individuals in learning new skills and to change the way they think and act, to live a law-abiding, offence-free lifestyle’ (Department of Corrective Services, WA, 2015-2018). The primary means by which the Department aims to achieve this is through offender rehabilitation.
Offender Rehabilitation

At its core, rehabilitation means to re-enable or make fit again (Craig, Gannon & Dixon, 2013). In the prison context, this translates into a focus on preparing prisoners to re-join society as law-abiding members of the wider community (Craig et al., 2013). For some prisoners, this could involve engaging in education and/or taking up an apprenticeship, which may help them gain employment upon release and reintegrate into the community. Most prisoners also need to engage in a criminogenic need program. Correctional programs consist of various psychotherapeutic programs which target specific problematic behaviours such as violence and drug use, which may have led the individual to engage in offending behaviour. Criminogenic programs are based on a Risk-Need-Responsivity model (Andrews & Bonta, 2003; 2006; 2010; Andrews, Bonta & Wormith, 2006; Andrews & Dowden, 2006).

The Risk-Need-Responsivity model (Andrews & Bonta, 2003) consists of three core principles - risk, need and responsivity - which are designed to guide the clinician in offender rehabilitation. The first two principles, risk and need, are used to select the program which best meets the offender’s needs (Craig et al., 2013). The risk principle holds that the higher the risk of reoffending, the higher the need for a high-intensity treatment program, with lower risk prisoners receiving minimal or no offender rehabilitation program (Andrews & Bonta, 1998; Andrews, Bonta & Wormith, 2006). The need principle specifically targets and seeks to improve the criminogenic needs that are associated with an increased risk of offending; such as antisocial attitudes, antisocial peers, substance use, dysfunctional family, lack of empathy, impulsivity/lack of self-control, and poor problem solving (Andrews & Bonta, 1998; Andrews, Bonta & Wormith, 2006). The third principle, responsivity, posits that the intervention (i.e., offender treatment program) which the offender engages in should address barriers to treatment such as poor motivation, cognitive skills, literacy deficits, depression, stress, anxiety. This process involves taking into account individual differences such as age, gender, culture, etc.,
to ensure that the intervention is optimally matched to the offender’s learning style and needs (Andrews & Bonta, 1998; Andrews, 2001; Beech, Mandeville-Norden & Goodwill, 2012; Birgden & McLachlan, 2002).

When trying to understand the Risk-Need-Responsivity of prisoners, therapists often need to consider the individual’s needs when engaging in Cognitive Behavioural Therapy (CBT), a common therapeutic model in rehabilitation programs within custodial settings. CBT principles have been shown to be effective in treating offenders (Strumolo, 2014), since its primary goals are congruent with the needs of offenders. It has been shown that offenders may have maladaptive thoughts, which CBT principles can counter by helping to restructure healthier thought patterns, which then lead to healthier behaviours (Strumolo, 2014). Identifying thoughts, feelings and behaviours requires the individual to utilise many cognitive skills such as problem solving, information processing, identifying goals, decision-making, maintaining attention, regulating emotions and developing coping skills (Beck, 2011; Brunette, Drake, McGovern, Merrens & Mueser 2009; Strumolo, 2014).

Many offender rehabilitation programs are based on CBT principles, and reflect the responsivity principle in the Risk-Need-Responsivity model. This model has been demonstrated to be the most effective method for reducing recidivism (Andrews & Bonta 2006; 2010). Meta-analytical studies have shown that CBT is the most efficient form of treatment for the general prisoner population compared to alternative methods such as motivational enhanced therapy (MET; Andrews et al., 1990; Izzo & Ross, 1990; Lipsey, 1995; Lösel, 1995, as cited in Khodayari Fard, Shokoohi-Yekta and Hamot, 2010, p. 752). Cognitive behavioural programs within prisoner rehabilitation programs target criminal thinking, emphasise individual accountability and attempt to teach prisoners skills to understand their thought patterns and how the choices they have made have influenced their criminal behaviour (Justice
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Action, 2012). Additionally, prisoners are given cognitive skills training to assist in identifying and restructuring risky thinking patterns and engaging in abstract thinking, long-term planning, perspective taking, and critical reasoning (Justice Action, 2012).

Therapies utilised in the prison system attempt to target criminal thinking and procriminal behaviour. Studies show a reduction in recidivism in prisoners who participate in offender rehabilitation programs (Andrews & Bonta, 2006; 2010; Khodayari Fard et al., 2010; Lipsey, Landenberger & Wilson, 2007). A meta-analysis of 58 studies examined the effects of CBT on recidivism among prisoners and found that one year after receiving CBT, the probability of not reoffending was greater for those who engaged in CBT compared to those who were untreated (Lipsey, Landenberger & Wilson, 2007). Whilst research has demonstrated that the cognitive behavioural approach alone reduces the probability of reoffending, Andrews and Bonta (2010) argue that greater reductions in recidivism are observed when CBT is utilized within the Risk-Need-Responsivity framework. However, according to recent data from the Office of Inspector of Custodial Services (Hon Joe Francis MLA, Minister for Corrective Services, 2014), the Department of Corrective Services (WA) has been neglecting the Risk-Need-Responsivity model’s third principle of responsivity, leading to a rise in recidivism. Adhering to these principles requires the Western Australian Department of Corrective Services to place prisoners in appropriate offender rehabilitation programs based on their criminogenic treatment needs, risk of reoffending, culture, gender, motivation (i.e., self-efficacy) and level of cognitive functioning (Andrews & Dowden, 2006; Landenberger & Lipsey, 2005; Oliver, Stockdale & Wormith, 2011).

The Risk-Need-Responsivity model is effective in reducing the prevalence of drug and alcohol abuse, but its effectiveness for prisoner rehabilitation is not clear. Empirical evidence suggests that CBT is effective for a wide range of problems but may be less effective with
individuals who have learning difficulties and lack the required cognitive skills, motivation and IQ level to achieve positive treatment outcomes (Craig et al., 2013). Chronic drug and alcohol use has been found to negatively affect several cognitive functions. These cognitive mechanisms, which may become impaired, are generally required to successfully engage in CBT (Forghani & Abadi, 2016). To further clarify the effect of cognitive impairments and motivational issues (i.e., self-efficacy) have on treatment outcomes, an in-depth analysis of the cognitive profile of Western Australian prisoners is needed.

**Substance Misuse and Rehabilitation**

Approaches to treating substance misuse in prisoner populations include harm reduction strategies, psycho-educational programs, therapeutic programs and prison-based therapeutic community (residential) programs. Psycho-educational programs provide people with information about substance abuse, generally focusing on symptoms, vulnerability, perpetuating factors, and treatment options (Mueser et al., 2002). Therapeutic programs specifically focus on treatment of substance abuse through active psychotherapeutic input. These programs seek to help individuals identify strengths and skills, build social support, address recovery issues, and develop self-care, boundaries, accountability, and trust. Prison-based therapeutic community (residential) programs are considered the most intensive form of rehabilitation offered (Casey & Day, 2014). They comprise an integrated model of care through drug treatment, therapeutic support, rehabilitation programmes, community and family participation. A consequence of Casey and Day’s (2014) model of care is increased sustainability and accountability towards the community. It includes the coordination of health professionals across the spectrum of the individual's life, and actively involves and builds support structures to encourage lifelong behaviour change.
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To date there have been limited published systematic reviews investigating the effectiveness of these drug treatment programs on later criminal behaviour. However, Lipton, Pearson, Cleland, and Yee (2002) conducted a meta-analysis review of 69 primary research studies of the effectiveness of behavioural and cognitive-behavioural treatment in reducing recidivism for offenders. In 1994, the National Institute on Drug Abuse (NDIA) funded the Correctional Drug Abuse Treatment Effectiveness project (CDATE) for four years to develop a comprehensive information database of correctional treatment evaluation studies. The project focused on treatment/intervention programs in prison, jail, probation, or parole settings documented from 1968 through to 1996. This involved coding over 2,176 published research studies comparing experimental groups with comparison groups and assessing the impact of various interventions, in particular on drug abuse and recidivism. Results from this heterogeneous collection of studies show that treatment is associated with reduced recidivism rates. The meta-analysis indicated that the reduction in recidivism was mainly due to cognitive-behavioural interventions rather than to standard behaviour modification approaches. The specific types of programs shown to be most effective included cognitive-behavioural social skills development programs and cognitive skills programs which incorporated reasoning and rehabilitation.

McGuire (1996) highlights that ‘there is no single cognitive-behavioural method or theory. Work of this kind is best thought of as a “family” or collection of methods rather than any single technique easily and clearly distinguished from others’ (p. 7). McGuire also indicates that cognitive behavioural approaches include social skills training (which uses modelling, role-play practice, and feedback), social problem-solving training, rational-emotive therapy, the cognitive skills program (also known as the Reasoning and Rehabilitation program, now replaced by Think First and covered in Chapter 3), and the relapse prevention model (pp. 42-49, 58-59, 65, 105-106).
The CDATE findings confirm that cognitive-behavioural programs can statistically reduce recidivism rates by significant amounts when compared to other treatment types usually employed in correctional settings. This was found to be true for the generalised category of cognitive-behavioural studies, and also for the subcategories social skills development training and cognitive skills training. Furthermore, studies found that offenders who engaged in therapeutic community treatment programs had more positive outcomes (e.g. reduced recidivism) compared with untreated individuals and those engaging in non-community-based therapeutic programs.

In 2008, Holloway, Bennett and Farrington systematically reviewed studies across Europe, UK and US, finding therapeutic community programs also showed the strongest reductions in reoffending. Their study was based on evaluations of treatment types for misuse of heroin, crystallised cocaine, and cocaine. Treatment types included methadone treatment, therapeutic communities, post release supervision, and drug courts. The overall (combined) effect indicated that treatment types significantly reduced re-offending by 29%. Amongst the treatment types, the Therapeutic communities program (reduction of 60%) was the strongest and best performing predictor of positive treatment outcomes. The findings showed that post-release supervision and methadone maintenance significantly reduced drug misuse, while drug courts were not found to be statistically effective. The odds of offending were between 2.8 and 3.8 times greater for drug users when compared to non-drug users. Understanding the role of drug use in offenders’ lives, and reducing their motivation to use illicit substances is thus of great importance in reducing recidivism. Developing programs that specifically target areas that can increase treatment success and reduce drug dependence will further increase pro-social behaviour and reduce negative behaviour in the community.
Holloway, Bennett and Farrington’s (2008) study not only confirmed an association between drug use and crime, but also provided a quantitative measure of the strength of this relationship. Their results showed that the relationship was not the same for all drug types. The odds of offending were highest among crystallised cocaine users (about six times greater), followed by heroin users (about three times greater) and then cocaine users (about 2.5 times greater). There was a statistical association (though weaker) between recreational drug use and offending (where the odds of offending were about 1.5 times greater for marijuana users and 1.9 times greater for amphetamines users). Overall, these results show that the strength of the drugs–crime connection varies by type of drugs used.

The research above has a number of implications for investigating the connection between drugs and crime. Firstly, the relationship between type of drug use and crime is varied and largely uncoordinated across a number of studies; different research teams have focussed on different outcomes, such as reducing recidivism after programmatic intervention, among differing populations, over different time periods, using different methods. Drawing conclusions from a diverse range of studies is particularly difficult. Second, the review has drawn attention to the problem of comparison groups. Ideally, it would be most useful to compare drug users with non-drug users. However, in practice, research is often based on samples selected from among drug users (e.g., drug users in treatment) or among samples with a high proportion of drug users (e.g., offender samples). This means that it is often difficult to identify a comparison group that is wholly drug free. Consequently, there may be considerable similarities between drug users and users of other drugs, which results in underestimation of a drugs–crime relationship.

For non-residential treatment methods, a meta-analysis conducted by Pearson and Lipton (1999) revealed treatment effectiveness varied as a function of therapeutic program type. For
example, Lipton et al.’s study (2002) involving more than 1000 participants showed that CBT produced more encouraging results when compared to other therapy types.

This does allow some conclusions to be drawn about the effectiveness of therapeutic program types, and the relationship between substance misuse treatment and recidivism. Research generally indicates that community based programs show the greatest amount of improvement in substance misuse problems when compared to other treatment options (psycho-education and therapeutic programs). However, heterogeneity should be considered when developing treatment approaches if optimal effectiveness is to be achieved, as higher intensity treatment is required for high risk offenders and less intensive treatment for low risk offenders (Casey & Day, 2014; Lipsey, 2009). This is not, however, a principle always adhered to in Australian treatment programs, with the impact of such intensive treatment on those at the lower end of the risk severity continuum becoming a critical issue. Although structured approaches to risk assessment have been developed to assess the risk of re-offending, there are few tools currently available that can reliably predict the likelihood of recidivism for an offender with a substance misuse issue. This may be due to the fact that some criminological theories of crime tend to portray substance use as a by-product of offending behaviour, rather than a causal factor (Levinthal, 2011).

Kelly and Welsh (2008) examined outcomes for 276 offenders who completed an intensive (1300 hour) prison based treatment program over a period of 12 months and who were followed up in the community for a period of at least 14.9 months. They found that risk assessment tools designed to identify the offenders’ risks and needs with regard to recidivism were significant predictors of likelihood of re-incarceration. The specific needs of the individual, particularly those who fell into the moderate/high, and high categories, required more detailed assessment to establish the function of substance misuse for each individual, and
the extent to which substance misuse could be considered a part of broader problematic patterns of behaviour. Jolley and Kerbs (2010) recently described how this might be achieved for prison based substance programs, in a model based on the Risk-Needs-Responsivity perspective (RNR). This model shows how the offender moves from an initial (standardised) risk assessment which examines his or her propensity for future relapse and recidivism, and helps to assign offenders into programs at an appropriate level of service intensity (i.e., type of service structure, dosage, duration, services offered). Following risk and needs assessment, offenders are provided with evidence-based programs responding to the institutional agenda, and any additional programs responding to offenders’ specific needs, taking into consideration their learning styles, motivations for treatment, personality traits, strengths, co-occurring bi-psycho-social needs, and their needs based on stage-based models of recovery.

Substance misuse treatment can have positive effects on reducing re-offending and, given the high prevalence of substance misuse in correctional populations, should be considered a core component of any rehabilitation strategy. Prison therapeutic community models of substance misuse treatment can be considered the treatment of choice, although there is also a need for group-delivered cognitive behavioural programs and pharmacological treatments (Casey & Day, 2014). The most significant reductions in reoffending are likely to occur when the nature of the relationship between the misuse of illicit substances and criminal behaviour is established. Once established, this relationship should guide program content; with risk of re-offending being assessed and programs targeted towards higher risk offenders; pharmacological (substitution) treatment offered as an adjunctive treatment and substance misuse treatment followed up by intensive post-release support and supervision services; and program content taking account of how the strength of the drugs–crime connection may vary according to the type of drug(s) used. Casey and Day (2014) also reported that prison-based treatment programs should be considered a critical component of rehabilitation programmes,
with justice outcomes likely to be improved when several key features are incorporated, such as cognitive impairments.

The relationship between drug and alcohol dependence and cognitive impairments

There is a large body of evidence which has consistently shown drug and alcohol dependence is associated with widespread neurocognitive impairments (Hart, Marvin, Silver & Smith, 2012; Squeglia, Jacobus & Tapert, 2009; Yücel & Lubman, 2007; Wetherill & Tapert, 2013). However, the extent of cognitive impairment varies on an individual basis and can be influenced by several variables, such as first age of substance use. These variations are important clinically, when considering choice of treatment and method of treatment delivery.

Neuropsychological research has linked chronic drug and alcohol use to damage to brain regions that are believed to subserve cognitive and executive functions (Herting, Fair & Nagel, 2012; Pluck, Lee, Rele, Spence, Sarkar, Lagundoye et al., 2012; Xi et al., 2011). Findings have consistently demonstrated that individuals with drug and alcohol use disorders display significant impairments in cognitive and executive functioning (Fernandez-Serrano, Perez-Garcia & Verdejo-Garcia, 2011; Hester, Lubman & Yücel, 2010; Verdejo-Garcia et al., 2010). Executive functioning involves a set of high order cognitive functions which are domain general (i.e. executive function is not exclusive to particular cognitive domains). They include many tasks that assist in the recalling and retrieving of previously learnt information, problem solving, selecting and successfully monitoring behaviours that facilitate the attainment of goals, and the learning of new information (Fernandez-Serrano et al., 2011; Rueda & Paz-Alonzo, 2013). Executive functions include basic cognitive processes such as attentional control, cognitive inhibition, working memory, cognitive flexibility and inhibitory control. Executive functioning has been found to influence an individuals’ quality of life, their scholastic and work performance and their ability to benefit from cognitive treatment.
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(Fernandez-Serrano et al., 2011; Rueda & Paz-Alonzo, 2013). These functions are generally thought to be engaged when an individual is involved in higher order cognitive functions such as planning for the future, maintaining goal-directed action, higher level attentional processes, emotion regulation and controlling impulsive behaviours (Donders, 2002; Jurado & Rosselli, 2007; Lezak, Howieson, Bigler & Tranel, 2012; Logue & Gould, 2014).

Alcohol and various drugs are believed to either collectively or selectively impair separate but interrelated cognitive and executive functions (Fernandez-Serrano, Perez-Garcia, Rio-Valle and Verdejo-Garcia, 2010). For instance, cannabis-dependence has been associated with impairments in decision-making, working memory, planning ability and attention span (Medina et al., 2007; Verdejo-Garcia et al., 2007). Impairments in decision-making have also been associated with cocaine and heroin dependence (Verdejo-Garcia et al., 2007; Verdejo, Toribio, Orozco, Puente, Perez-Garcia, 2005). Cocaine dependence can result in impairments in working memory and inhibition, while in heroin dependence impairments are additionally seen in cognitive flexibility as well as inhibition (Brand, Roth-Bauer, Driessen & Markowitsch, 2008; Fishbein et al., 2007; Kübler, Murphy, & Garavan, 2005). Alcohol dependence is associated with long-lasting executive and functioning impairments affecting sustained attention, planning ability, working memory, inhibition, decision-making, cognitive flexibility and fluency (Chanraud et al., 2007; Loeber et al., 2009; Fernandez-Serrano et al., 2010; Pitel et al., 2009).

Nevertheless, it is difficult to establish the effects of a specific substance on any one given executive or cognitive task, since studies are commonly conducted on poly drug and alcohol using groups (Fernandez-Serrano et al., 2011; Morgan, Impallomeni, Pirona & Rogers, 2006; Rogers et al., 2009). Additionally, research in this complex field is compounded with the potentially detrimental effects of lower education and aging on executive function (Fernandez-
Serrano, et al., 2010; van der Elst, Van Boxtel, Van Breukelen & Jolles, 2006). Furthermore, research has found that to explore the association between substance dependence and specific impairments in executive and cognitive functioning, it is also necessary to explore the patterns of severity and dosage of substance use, number of months or years of substance use and initial age at onset of substance use (Glass et al., 2009).

Fernandez-Serrano et al (2010) explored the consequences of alcohol and drug dependence on domains of executive function, and the impact which severity and number of years of drug use had on an individual’s cognitive function. Their sample consisted of 60 substance-dependent individuals and 30 healthy controls with findings indicating that drug and alcohol dependent participants performed significantly poorer on executive function measures compared to the control group. The consumption of alcohol, cannabis and cocaine had a significant effect on verbal fluency and decision-making, with the drug dependent group scoring significantly lower than the controls. There were also similar significant effects for quantity of cannabis and cocaine on performance in verbal working memory and reasoning; and for duration of cocaine and heroin use on cognitive shifting and inhibition measures. Fernandez-Serrano et al (2010) also found that severity (amount of consumption) and number of years of substance use may be associated with a decline in attention and response inhibition, whilst other research indicates that daily substance use affects on inhibition control only (Madoz-Gûrpide, Blasco-Fontecilla, Baca-Garcia & Ochoa-Mangado, 2011; Verdejo et al., 2005).

Although research findings confirm the neuropsychological impact of chronic drug and alcohol use and dependence, this research does not adequately clarify the true effect a drug’s use can have on cognitive function, due to the difficulty of collecting a mono-substance user sample (Fernandez-Serrano et al., 2011). Some researchers have dealt with this limitation by
controlling for poly drug and alcohol use through statistical analysis or methodological design (Fernandez-Serrano et al., 2011; Morgan, Impallomeni, Pirona & Rogers, 2006; Rogers et al., 2009) or sampling populations with cultural peculiarities (Fernandez-Serrano et al., 2011; Fishbein et al., 2007). It is important to mention that in these studies, impairment in several neurocognitive functions (e.g., inhibition or decision-making) declined during a period of abstinence, whilst some impairments (e.g., processing speed and memory) persisted even after extensive periods of abstinence (Fernandez-Serrano et al., 2011; Gould, 2010).

The Impact of Cognitive Impairments on Treatment Outcomes

Neuropsychological findings indicate that between one third and three quarters of individuals who chronically misuse alcohol or other drugs have some measurable cognitive impairment (Gould, 2010). These cognitive impairments have been strongly associated with impaired neurological systems. Of relevance to treatment outcomes, damage to neurological systems is likely to reduce an individual’s ability to function normally in everyday living, as well as their capacity to learn, interpret and apply newly learned information when engaging in psychotherapeutic intervention, thus potentially compromising successful treatment outcomes (Aharonovich et al., 2006; Bates, Pawlak, Tonigan & Buckman, 2006).

Adequate cognitive and executive function is required for many activities specific to psychosocial and cognitive behavioural therapies (Goodkind et al., 2015; Pinquart, Duberstein & Lyness, 2006) and is thus a key factor in treatment outcomes (Aharonovich et al., 2006; Fernandez-Serrano, Perez-Garcia & Verdejo-Garcia, 2011; Passetti et al., 2008; Rueda & Paz-Alonzo, 2013). Cognitive processes such as focusing, planning, organising and strategizing are integral to effective psychotherapeutic intervention and if impaired, may reduce the effectiveness of therapy (Goodkind et al., 2015). It is therefore reasonable to assume that cognitively impaired individuals participating in a cognitively oriented treatment program may
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encounter difficulties in treatment. This is because therapy requires several skills to achieve success; such as verbal, memory and learning skills which, as this review has indicated, are often impaired in this population. Yet these abilities are a pre-requisite for engaging in psychotherapeutic treatment (Goodkind et al., 2015; Teichner, Harvey, Horner & Johnson, 2001).

Successful CBT outcomes for individuals include learning new coping and situation avoidance skills to prevent relapse and engaging in future-oriented behaviour (Beck, 2011; Brunette et al., 2009). To benefit, individuals must attend to, comprehend, and recall information presented in therapy sessions. They must also learn how to adapt and apply general techniques to situations in their own lives, learn to challenge automatic thoughts, suppress behaviours associated with triggers and develop strategies to solve problems, make decisions, plan daily activities and set goals. As found by Leber and colleagues (1985), in earlier studies on neurocognitive functioning, participants with poorer performance on neurocognitive measures made less clinical progress. They were also rated as having poorer prognosis at the end of treatment.

Neurocognitive impairment can be expected to cause interference with the engagement and attainment of therapeutic skills, leaving the individual struggling to engage in rehabilitative programs, thus leading to poorer treatment outcomes (Aharonovich et al., 2006; Passetti et al., 2008; Worley, Tate, Granholm & Brown, 2014). Empirical evidence suggests that treatment outcome is predicted by the level of neurocognitive functioning, with lower neurocognitive functioning linked to treatment non-completion and length of stay in in-patient treatment centres (Aharonovich et al., 2006; Passetti et al., 2008; Turner, LaRowe, Horner, Herron & Malcolm, 2009). As substance-dependent prison populations have cognitive impairments greater than those seen in the community, they also have poorer treatment outcomes, thus
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leading to higher rates of rule violation, poorer cognitive acquisition, premature dropout rates, and increased recidivism (Aharonovich et al., 2006; Oakley Slade, Johnston, Oakley Browne, Andrews, & Whiteford, 2009; AIHW, 2014).

For instance, Andrews (2009) conducted a study on a sample of alcohol and amphetamine dependent individuals with lower levels of neurocognitive function and found that those with cognitive impairments developed fewer skills such as coping behaviours and emotional regulation skills, placing them at higher risk of relapse. Similarly, Aharonovich et al. (2006) conducted a study on a sample of cocaine dependent patients engaging in CBT programs in outpatient clinics, and found that those who dropped out of treatment had significantly poorer neurocognitive functioning than treatment completers. Poorer functioning occurred across several domains, including memory, attention, spatial ability, speed of processing, global functioning and cognitive proficiency. Teichner, Horner, Roitzsch, Herron and Thevos (2002) also found that participants who dropped out of treatment had a higher number of measures in the impaired range (<10th percentile). It is therefore plausible to suggest that treatment attrition and subsequent poorer treatment outcomes may be at least partially due to cognitive impairment. Being aware of an individual’s cognitive profile prior to commencing psychotherapeutic intervention may result in better treatment outcomes, in accordance with the responsivity factor of the Risk-Need-Responsivity model (Andrews & Bonta, 2010).

An individual’s cognitive profile is only one of a multitude of other factors which have been noted to affect treatment outcomes. Other factors include, but are not limited to: treatment readiness, therapeutic alliance, motivation and self-efficacy (Copersino et al., 2012; Jang, Conradi, McKenna & Jones, 2015; Morgenstern & Bates, 1999). Motivation, albeit a complex and difficult to define construct, has been well-researched in treatment outcome research. Studies however, have suggested that neuropsychological impairments may also affect
outcomes in treatments based on behaviour change, particularly programs that focus on self-efficacy (Bates et al., 2006; Morgenstern & Bates, 1999). For this reason, motivation, in particular self-efficacy, is important to explore amongst the prison cohort.

Motivation

Motivation is considered a critical component for engaging in treatment (Jang et al., 2015; Reiss, 2012). Motivation can be external or internal. External motivation relates to engaging in treatment due to external forces such as being legally coerced by parole or early release conditions (Reiss, 2012; McMurran, 2002; Olson & Weber, 2004). By contrast, internal motivation involves a perceived need to change (McMurran, 2002; Olson & Weber, 2004; Reiss, 2012). Miller and Rollnick’s (1998) theory of motivation as well as Bandura’s (1977) social cognitive theory of self-efficacy provide frameworks with which to understand the processes involved in internal motivation which are required for successful psychotherapeutic treatment.

Miller and Rollnick’s theory (1998) focuses on the multidimensional nature of motivation and proposes that a person must be ready, willing, and able to engage in mechanisms of change such as psychotherapeutic treatment. However, Miller and Rollnick (1998) indicate that for motivation to occur, the individual must first be able before they are willing and ready to engage in change (Hollin & Palmer, 2009), suggesting that cognitive ability is the first essential step to therapeutic success. In relation to cognitive capability, it has been argued that people’s judgement of their own capacity to engage in tasks can be equally significant (Kelly & Greene, 2014). Consistent with this notion is the psychological construct of self-efficacy (Bandura, 1986).
Self-efficacy and Treatment Outcome

Self-efficacy refers to a belief in one’s ability to succeed in accomplishing a task or to navigate a specific situation (Bandura, 1986). Self-efficacy plays a significant role in general models of behaviour change, as well as influencing how an individual approaches tasks, challenges and goals (Kelly & Greene, 2014). In particular, self-efficacy is instrumental in Bandura’s (1986) social cognitive learning theory and the Transtheoretical model (Prochaska & Di Clemente, 1983). Self-efficacy has been identified as an important predictor of treatment outcomes among a myriad of issues including drug and alcohol use (Forcehimes & Tonigan, 2008; Kadden & Litt, 2011; Kelly & Greene, 2014; Randall et al., 2003). For example, as a predictor of treatment outcome, an individual may feel confident in their ability to perform a task (high self-efficacy), but may have little motivation to do so (Kelly & Greene, 2014). Similarly, an individual may have low confidence in their ability to perform a task (low self-efficacy), even though they may be highly motivated to do so (Kelly & Greene, 2014).

Bandura and Locke (2003) reviewed nine meta-analyses which examined self-efficacy across several areas including psychosocial functioning. Findings indicated that coping behaviour and perseverance in resolving difficult problems were mediated by self-efficacy beliefs. They concluded that belief in one’s ability to achieve through one’s own efforts was necessary to sustain coping behaviours. Specifically in relation to self-efficacy in those with drug and alcohol dependence issues, Yen, Wu, Yen and Ko (2004) found that a brief cognitive behavioural intervention with methamphetamine and heroin users resulted in improved confidence in skills such as resisting impulsive urges. Further studies postulated that if individuals are taught coping mechanisms such as social, problem solving and communication skills and are successful in implementing these newly acquired skills, this mastery experience is likely to enhance self-efficacy (Kadden & Litt, 2011; Longabaugh et al., 2005; Martinez et al., 2010). Individualised intervention strategies such as keeping homework tasks simple and
catering to different learning styles are more likely to successfully increase client self-efficacy and subsequently foster treatment gains (Curry & Marlatt, 1987; Kadden & Litt, 2011).

Previous research conducted by Stephens, Wertz and Roffman (1995) and Allsop, Saunders and Phillips (2000) used two groups of male problem drinkers to investigate the effect of CBT interventions on self-efficacy. One group received CBT and the other group received social support intervention. Results indicated that following intervention, the CBT group reported higher levels of self-efficacy compared to the group receiving social support. These findings were supported by DiClemente et al. (2001), who found greater improvements in self-efficacy for substance users engaged in CBT compared to those who received Motivational Enhancement Therapy (MET).

Research has also provided support for the idea that specific treatment-related tasks can increase self-efficacy post-intervention, thus ultimately facilitating positive treatment outcomes. For example, goal setting, coping skills and stress management during therapeutic intervention was found to be associated with greater levels of self-efficacy (Ilgen, McKellar & Moos, 2007; Lozano & Stephens, 2010; Majer, Jason, Ferrari, Olson & North, 2003; Walton, Blow, Bingham & Chermack, 2003). Allsop, Saunders and Phillips (2000) indicate that individuals who are unlikely to persist with challenges or difficulties tend to lack skills to carry out change and therefore have low self-efficacy. Kadden, Litt, Kabela-Cormier and Petry (2007) and Litt et al. (2008) also found that the ability to learn coping skills such as persisting with challenges during treatment was positively correlated with increased self-efficacy post-treatment, thus providing support for the proposition that practice with coping skills is likely to increase self-efficacy.

Overall, Miller and Rollnick’s (1998) theory of motivation (able, ready and willing) and self-efficacy both contribute to improving treatment outcomes. As previously discussed, self-
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efficacy plays a key role in motivation and is associated with cognitive skills such as coping and problem-solving skills. Individuals with cognitive impairment tend to exhibit difficulty in executing these skills and thus often present with low self-efficacy, subsequently adding to the multifactorial nature of assessing treatment outcomes. Further research on the relationship between cognitive impairments and self-efficacy is therefore required to effectively tailor psychotherapeutic interventions and maximise optimal treatment outcomes.

Overview

The literature reviewed above provides strong support for the association between substance dependence and impairments in cognitive domains which are critical if individuals are to benefit from psychotherapeutic programs, including CBT (Forghani & Abadi, 2016). Previous studies have also found that a history of substance dependence is strongly associated with impairments in cognitive domains (Fernandez-Serrano, Pérez-García, Rio-Valle & Verdejo-García, 2010; Verdejo-García, López-Torrecillas, Giménez & Pérez-García, 2004), which can potentially compromise the ability to engage in, and benefit from rehabilitation programs. For these reasons, engaging in CBT programs without adequate cognitive skills could be expected to result in poorer treatment outcomes. Importantly in relation to prisoners, without an adequate cognitive skill set before engaging in prisoner rehabilitation programs, treatment outcomes may well be compromised. This in turn could have other knock-on effects, such as greater likelihood of reoffending.

To address this gap in the research, the present study aims to investigate the cognitive profile of a large sample of Western Australian prisoners to identify cognitive and motivational factors with potential to compromise treatment outcomes in the rehabilitative process. The findings from this study thus have the potential to provide insight into the development of effective rehabilitation programs within the prison population.
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To this end, the first study aimed to explore the cognitive profile of Western Australian prisoners with a history of substance dependence. Based on previous research, it was hypothesised that:

1. A history of substance dependence (as defined by diagnosis set out in the DSM-IV) has been associated with cognitive impairments (Fernandez-Serrano, Pérez-García, Rio-Valle & Verdejo-García, 2000; Verdejo-García, López-Torrecillas, Giménez & Pérez-García, 2004). It was therefore anticipated that relative to the general population, Western Australian prisoners with a history of substance dependence would demonstrate cognitive deficits on various neurocognitive measures in the domains of memory, processing speed, and executive functioning.

2. It was also hypothesized that several variables pertaining to substance use (i.e. age of onset, number of substances used, frequency and total years of substance use) would predict performance on neurocognitive measures, with greater and longer use of substances associated with poorer cognitive performances.

The findings of the first study provide information regarding the cognitive profile of Western Australian prisoners, as well as useful data for clinicians on the prisoner cognitive functions which may require additional attention prior to commencement of psychotherapeutic programs. This study is presented in Chapter 2.

The second study aimed to explore the relationship between cognitive function and the motivational factor, self-efficacy in prisoners after the completion of a cognitive skills program provided in Western Australian prisons. Research indicates that self-efficacy influences treatment outcomes. A point of inquiry in the second study was whether cognitive function affects motivation, and by extension treatment outcomes. Treatment outcome was measured by self-reported self-efficacy associated with an individual’s readiness to engage in therapy.
The hypotheses associated with this aim are articulated in chapter 4, which presents the second study, as they will be informed by the outcomes of Study 1.

Findings from the two present studies will:

1. Provide clinicians with a general understanding of the importance of assessing individual prisoners’ cognitive abilities prior to engaging in intensive psychotherapy requiring adequate cognitive skills;
2. Provide information for clinicians on factors which may compromise treatment, and suggest strategies which can be used to increase motivation and self-efficacy;
3. Provide guidelines for program delivery which allow prisoners to maximise therapeutic benefits in accordance with their cognitive needs and capacity.

These findings are beneficial not only to the custodial system, but also clinical psychology in general. By understanding the impact of substance use on neurocognitive function and how it affects motivation and treatment outcomes, clinicians and policy makers will be able to develop effective treatment programs for the wider community, as well as programs which increase positive health outcomes and reduce recidivism in the prison population.
Chapter Overview

The first study aims to provide an overview of the cognitive and executive functioning impairments prevalent amongst Western Australian prisoners, and to stress the importance of considering the implications these functioning impairments may have on delivering offender rehabilitation programs.

Dealing with drug use and working with those who have complex drug dependencies remains a difficult challenge for criminal justice practitioners (Sweeney & Payne, 2011). Drug and alcohol use disorders are prevalent in Western Australian prisons compared to the general population (Schilders & Ogloff, 2014). In 2013, 74% of female prisoners and 77% of male prisoners fulfilled a diagnosis of drug and alcohol use disorder, compared to 3.3% of females and 7% of males in the community (Davidson et al., 2015). Drug offences were also among the most common offences and charges leading to imprisonment (i.e., 17% of incarcerated prisoners in 2015; ABS, 2016).

Clinicians are often faced with several issues and challenges when working with those who have complex drug dependencies, including: participant motivation, poly drug use and cognitive functioning (Costanzo 2003; Sweeney & Payne, 2011). Poly drug users have poorer treatment retention rates and higher post-program reoffending rates when compared to offenders who are not poly drug users (Furby & Kevin, 2008; Sweeney & Payne, 2011).
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Drug and Alcohol Dependence and Cognitive Impairments

There is a burgeoning literature detailing the impact of chronic long-term drug and alcohol use on cognitive functioning (Bolla et al., 2004; Ersche & Sahakian, 2007; Goldstein & Volkow, 2002; Kalechstein, Jentsch & Kantak, 2008; Kiluk, Nich & Carroll, 2011; Sofuoglu, Sugarman & Carroll, 2010; Umut et al., 2016; Yücel & Lubman, 2007). Cognitive functions that are affected include language, learning and memory, attention, speed of processing and visual abilities (Hadjiefthyvoulou, Fisk, Montgomery & Bridges, 2010; Krämer, Kopyciok, Richter, Rodriguez-Fornells & Münte, 2011; Latvala et al., 2009; Lezak, 2004). Executive functioning, a higher order of cognitive functioning, has been found to be impaired in domains of decision-making, problem solving, strategic planning, cognitive flexibility, inhibition abilities and impulse control (Forghani & Abadi, 2016; Krämer et al., 2011; van Der Plas, Crone, van den Wildenberg, Tranel & Bechara, 2009; Vo, 2010). Studies in this field have mainly focused on the impact of cannabis, alcohol, opioids, and methamphetamines/amphetamines on neurocognitive functions.

Chronic cannabis use has been linked to cognitive impairments in attention, verbal learning, memory, and working memory. There are methodological differences across studies in terms of how and when patients/participants have been tested after a period of sobriety. It is not known whether these impairments are a direct result of the cannabis residue remaining in the body or of its impact on the brain (Solowij et al., 2002; Umut et al., 2016). Studies on the impact of opioids on cognitive and executive functions have demonstrated impairments in similar areas, but show high variability in terms of methodology and the population being assessed (Shmygalev et al., 2011).

Amphetamine and methamphetamine abuse is widespread within the prison system, with a dependency on these psychostimulants known to cause a broad range of severe cognitive
impairments (ABS, 2016; Sweeney & Payne, 2011). A meta-analysis conducted on the neuropsychological effects of methamphetamine abuse/dependence revealed deficits in memory, processing speed, motor skills, executive functions, language and visuo-constructional abilities, with medium effect sizes reported between the effect of use and cognitive performance (Hart, Marvin, Silver & Smith, 2012; Scott et al., 2007). Researchers in this area often make assumptions that methamphetamine abusers exhibit cognitive and executive deficits. However, findings from a critical review conducted by Hart and colleagues (2012) suggested that short-term acute methamphetamine abusers may show improvement in some domains, for example, visuospatial perception, attention and response speed. It is possible however, that the larger the dose of methamphetamine used, the greater the negative effects on cognition will be observed.

Alcohol dependence and cognitive impairment often occur co-morbidly (Clarke et al., 2015; Hester et al., 2010). Clarke and colleagues (2015) explored the genetic overlap between cognitive abilities and alcohol dependence in a population-based cohort. Findings indicated that alcohol consumption positively correlated with cognitive ability, particularly on verbal fluency. Whilst cognitive impairments in executive functions such as verbal fluency are common in alcohol-dependent individuals, it is possible these may abate after each year of alcohol detoxification (Clarke et al., 2015; Fernandez-Serrano et al., 2010; Stavro, Pelletier & Potvin, 2013). Verbal fluency is a frontal lobe process (Fuster, 2008). Damage to the frontal lobe is often associated with problems controlling immediate gratification urges (Berlin, Rolls & Kischka, 2004; Clarke et al., 2015). Although a growing body of literature exists on the relationship between alcohol dependence and cognitive impairments, methodological limitations such as over-reliance on self-report measures has resulted in these impacts being potentially underestimated.
Importantly, several variables such as the number of drugs used, the dose and frequency of drug use and age of initial drug use contribute to the varying degree to which an individual experiences neurocognitive impairment (Verdejo et al., 2005; Madoz-Gúrpide et al., 2011). Studies conducted on poly drug users where amphetamine was the primary substance found the severity of substance use was negatively associated with working memory, response inhibition and cognitive flexibility (Verdejo et al., 2005). Similar results were found with poly drug users where cocaine was the primary substance, with increased years of substance use affecting response inhibition, task setting and attention (Madoz-Gúrpide et al., 2011). In a poly drug use study conducted by Cunha, Nicastri, de Andrade and Bolla (2010), daily consumption of cannabis negatively correlated with inhibitory control, daily amount of alcohol consumed positively correlated with mental flexibility and attention; whilst years of use for cocaine users negatively correlated with cognitive functioning performance.

Other poly-substance use research focused on exploring differential contributions and severity of substance use (quantity and duration) has yielded similar results. For example, Fernandez-Serrano and colleagues (2010) found that severity of alcohol use was associated with decision-making and verbal fluency deficits, whilst quantity of cocaine and cannabis use correlated with degree of detrimental effects on decision-making, verbal working memory and reasoning. Additionally, long-term heroin and cocaine use was associated with visuo-spatial shifting deficits, whilst long-term cocaine use affected response inhibition. Verdejo-Garcia and colleagues (2006) also found higher severity of alcohol and cannabis use was positively associated with executive dysfunction scores.

When exploring the effect of age of onset of drug and alcohol use on cognitive impairment, it is important to understand neural pruning. Neural pruning is generally seen to be influenced by environmental factors and widely thought to indicate and influence the
process of learning. During adolescence (11 to 18 years) the brain undergoes biological change, called neural pruning. Neural or synaptic pruning is the process of removing neurons that are no longer being used in cognitive functioning. It occurs between early childhood and the onset of puberty, and is completed by the time of sexual maturation (Squeglia, Jacobus & Tapert, 2009). It is believed to be influenced by several environmental factors, but any exposure to neurotoxins such as alcohol and drugs can disrupt this biological process, resulting in impaired neurodevelopment, cognitive ability, and behavioural problems (Squeglia et al., 2009; Wetherill & Tapert, 2013). MRI studies of the adolescent brain have demonstrated the cognitive harm caused by heavy alcohol and drug use. For example, adolescent heavy alcohol users exhibit deficits in the areas of spatial working memory (Squeglia et al., 2009; Tapert, Pulido, Paulus, Schuckit & Burke, 2004), inhibition tasks (Tapert et al., 2007) and verbal encoding (Schweinsburg, McQueeney, Nagel, Eyler & Tapert, 2010). Adolescent cannabis users demonstrated similar deficits in areas of the brain requiring attentional control, suggesting that cannabis users required more effort when trying to self-regulate behaviour (Dishion, Felver-Grant, Abdullaev & Posner, 2011). Drug use has also resulted in impaired executive functioning (Hanson, Cummins, Tapert & Brown, 2011; Thoma et al., 2011), memory (Brown, Tapert, Granholm & Delis, 2000; Schwartz, Gruenewald, Klitzner & Fedio, 1989; Squeglia et al., 2009) and attention control (Ehrenreich et al., 1999; McQueeney et al., 2009; Tapert, Baratta, Abrantes & Brown, 2002). These impairments can manifest as memory loss, concentration difficulties, poorer motor and coping skills, heightened risk-taking behaviours, strained intimate and non-intimate relationships, financial issues, and crime-related behaviours. Additional evidence has also suggested that early onset of drug use, such as in adolescent years, is linked to development and persistence of cognitive impairments throughout life and can greatly exacerbate, precipitate or perpetuate pre-existing cognitive and behavioural deficits (Becker, Wagner, Gouzoulis-Mayfrank, Spuentrup & Daumann, 2010) or consequences of
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substance use on brain maturation (Wetherill & Tapert, 2013). In summary, adolescent drug and alcohol use and dependence negatively affect cognitive and executive functioning, and can have long-term implications for an individual’s quality of life and inhibit their ability to learn new skills.

Impact of Cognitive Impairments on Psychotherapy

It is estimated that more than half of individuals who enter psychotherapeutic intervention show mild to severe neuropsychological impairment, particularly in tasks requiring new learning, memory, attention, as well as other fluid cognitive abilities and executive control (de Arcos, Verdejo-Garcia, Peralta-Ramirez, Sanchez-Barrera & Perez-Garcia, 2005; Andrews, 2009; Bates & Convit, 1999; Bates, Labouvie & Voelbel, 2002; Kiluk et al., 2011; Vo, 2010). Determining cognitive decline is essential for understanding the impact substance abuse has on prisoners. However, to understand cognitive decline, we must first have a meaningful measure of the individual’s cognitive function prior to substance use. The Premorbid IQ is the current ‘gold standard’ measure used which provides baseline assessment scores that reflect previous premorbid functioning and which can be used to compare against an individual’s current performance. Comparing baseline assessment and current performance is necessary for evaluating the changes in cognition over time (Alves, Simões, Martins, Freitas & Santana, 2013). Scores that fall within .5 standard deviations below the normative mean are considered to exhibit borderline cognitive impairment, those falling within 1 standard deviation below the normative mean indicate probable impairment (Lezak, 2001), whilst scores that fall 1.5 standard deviations or more below the normative mean are considered cognitively impaired (Lezak, 2001; Strauss, Sherman & Spreen, 2006).

Some evidence supports the use of CBT in the treatment of substance use disorders and in prisoners (Sacks, McKendrick & Hamilton, 2012; Lanza, Garcia, Lamelas & Gonzalez-
Menendez, 2014; Wolff, Frueh, Shi & Schuman, 2012). However, other research has indicated that poorer cognitive functioning has been associated with program attrition and worse treatment outcomes in CBT (Aharonovich et al., 2006; Aharonovich et al., 2003).

Aharonovich et al. (2006) conducted a study on cocaine dependent individuals who were engaged in CBT. Findings revealed that patients who dropped out of treatment had significantly poorer neurocognitive function than treatment completers in several domains including measures of attention, memory, global functioning, and processing speed. Andrews (2010) also explored neurocognitive impairments and their impact on contemporary substance dependence treatment programs. Results indicated that treatment completers performed significantly better on measures of memory, learning and working memory compared to non-completers. The authors also noted that poorer performances in tests of attention were associated with poorer treatment outcomes.

A recent study conducted in Perth, Western Australia on decision-making indicated that 40 substance-dependent individuals who received treatment at a local rehabilitation inpatient program performed better as the decision-making task progressed compared to the control group, despite the mean net scores being higher for the control group compared to the substance-dependent group (Vo, 2010). These findings are consistent with previous research. This research also suggested that even after a period of abstinence, people with a history of substance dependence may still experience difficulties in decision-making domains (Vo, 2010). These findings suggest that individuals with decision-making impairments typically neglect to consider the pros and cons of their actions, thus affecting their capacity to consider risks or anticipate negative future outcomes, as well as affecting their ability to engage in treatment (Bowden-Jones, McPhillips, Rogers, Hutton & Joyce, 2005; Passetti et al., 2008; Vo, 2010).
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

There is compelling evidence that individuals who have a history of substance dependence often have measurable cognitive impairments (Yücel & Lubman, 2007). Cognitive and executive impairments such as decision-making, organizing daily activities, planning goals, time perception, internal language and problem solving are some of the most important functions that allow humans to live and learn (Forghani & Abadi, 2016; James, 2010; McGough et al., 2011). These impairments negatively affect learning skills which are essential to successful treatment outcomes, and this presents a major challenge for clinicians when facilitating offender rehabilitation programs based on principles of CBT (Aharonovich et al., 2003; Aharonovich et al., 2006; Passetti et al., 2008; Teichner et al., 2002).

The present study explores the impact of the number of substances used, the duration of substance use, the frequency of use and the first age of substance use on various cognitive and executive functions. It is anticipated that the outcomes of this research will provide the Department of Corrective Services Western Australia and clinicians with additional insight into the cognitive decline in prisoners. Increased knowledge and understanding of the unique cognitive profile of prisoners may encourage correctional institutions to reassess the current criteria and procedures involved in assessing prisoners for offender rehabilitation programs. Additionally, this knowledge will further assist clinicians in creating a program that will be optimally beneficial to prisoners, and enable them to engage in psychotherapeutic programs to change their problematic behaviour, ultimately reducing their likelihood of reoffending.

Hypotheses

There are three main hypotheses in this study.
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Hypothesis 1

The study focussed on analysing the percentage of prisoners that fell within the clinically meaningful range of what is considered impaired, that is, at least 1.5 standard deviations below the normative mean. It was therefore hypothesized that there would be a statistically significant difference between prison sample and normative population z score means, with prisoners scoring lower than the normative population across each of the cognitive and executive measures (µ=0).

Hypothesis 2

While research is sparse on poly drug use, it does suggest a relationship between age of initial onset of drug use, frequency, and chronicity, and type of drug use, and cognitive impairment. It was therefore hypothesised that earlier onset, greater frequency, chronicity and number of substances used would predict poorer performance on cognitive and executive measures.

Hypothesis 3

Finally, research has indicated that there is a relationship between lower scores on decision-making task measures (using the IOWA Gambling Task) and drug dependency, indicating that drug dependency is associated with poor decision-making. It was therefore hypothesised that Western Australian prisoners would show significantly lower total scores on the IOWA Gambling Task (measure of decision-making) compared to a Perth community sample.
Method

Participants

115 non-Aboriginal incarcerated offenders aged 18 or older who had a diagnosis of substance dependency at time of program enrolment were invited to voluntarily participate in a prison-based cognitive skills program - ‘Think First’ (TF) - by TF facilitators.

It is acknowledged that there is a higher proportion of Aboriginal offenders incarcerated relative to the proportion of indigenous Australians in the community. However Aboriginal offenders could not be included due to i) the difficulty of recruiting an appropriate sample though the Department of Corrective Services; and ii) the psychometric tests used have not been normalised for Aboriginal people and so their test performances could not be appropriately interpreted.

To be included in the study, participants had to have had a self-reported abstinence period greater than 56 days prior to the neuropsychometric assessment. This cohort was selected to determine the level of cognitive problems that prisoners might have prior to engaging in a non-therapeutic program as their first point of intervention within the custodial system, compared to those who are streamlined into a therapeutic program as their first point of intervention. Recruitment took place at five Western Australian prison sites, including two female prisons (one maximum security and one minimum security pre-release centre) and three male prisons (one maximum security and two minimum security prison farms). There were different facilitators at each prison location.

The primary inclusion criterion was a current DSM-IV (American Psychiatric Association, 2000) diagnosis of substance dependence. This was assessed by the researcher by ensuring that each individual met the criteria set out in DSM-IV (American Psychiatric
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Association, 2000). The researcher is a qualified Psychologist, with 14 years’ experience working with substance use offenders and assessing individuals in accordance with the DSM-IV.

To achieve a positive diagnosis, participants needed to present at least two of the 11 different criteria outlined below:

- Taking the substance in larger amounts or for longer than one is supposed to;
- Wanting to cut down or stop using the substance but not managing to;
- Spending a lot of time getting, using, or recovering from the use of the substance;
- Experiencing cravings and urges to use the substance;
- Not managing to do what one should do at work, home, or school because of substance use;
- Continuing to use, even when it causes problems in relationships;
- Giving up important social, occupational, or recreational activities because of substance use;
- Using substances again, even when it puts one in danger;
- Continuing to use, even in the face of a physical or psychological problem that could have been caused or made worse by the substance;
- Needing more of the substance to get desired effect (development of tolerance);
- Development of withdrawal symptoms, which can only be relieved by taking more of the substance.

It could not be guaranteed that participants were abstinent from substance use prior to testing, as some prisoners are known to use substances whilst incarcerated. Furthermore, the
researcher was not granted permission to look up each participant’s prison conduct record for the purposes of this research.

Participants who had a history of significant head injury or overdose (information collected through the semi-structured interview), or elevated symptoms of depression or anxiety at the time of cognitive assessment, as measured by the Depression, Anxiety and Stress (DASS21: Lovibond & Lovibond, 1995) questionnaire were excluded from the final data sample. The participants’ self-reported DASS scores were in the mild range. To ensure participants were motivated to perform their best on assessment tasks, participants with a score below 45 in the Test of Memory Malingering (TOMM: Tombaugh, 1996) were also excluded from the final sample. On this basis, no participants were excluded from the study.

All participants were poly drug users. Socio-demographic details of the final sample are provided in Table 1. Participants in the final sample included 72 males and 43 females, who ranged in age from 19 to 60 years ($M = 33.61, SD = 8.64$). The larger male sample is likely due a result of more TF programs being available in male prisons at time of data collection. Level of education ranged between Year 7 to the first year of TAFE or University. Approximately 39% had completed Year 9 and 41.7% had completed Year 10.
Table 1: Demographic Information for Prison Sample (n=115)

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>Percentage (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32.4(8.3)</td>
<td>63 (72)</td>
</tr>
<tr>
<td>Female</td>
<td>35.6(8.9)</td>
<td>37 (43)</td>
</tr>
<tr>
<td>Education (Years Completed)</td>
<td>9.7 (1.5)</td>
<td></td>
</tr>
<tr>
<td>7-9</td>
<td></td>
<td>39 (45)</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>42 (48)</td>
</tr>
<tr>
<td>11-12</td>
<td></td>
<td>18 (21)</td>
</tr>
<tr>
<td>12+</td>
<td></td>
<td>1 (1)</td>
</tr>
<tr>
<td>Substance Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of Onset</td>
<td>12.8 (3.5)</td>
<td></td>
</tr>
<tr>
<td>Total Months Used</td>
<td>916 (542)</td>
<td></td>
</tr>
<tr>
<td>Number of Substances Used</td>
<td>9 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Frequency of Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>12.2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>DASS 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression Subscale</td>
<td>7.8 (8.2)</td>
<td></td>
</tr>
<tr>
<td>Anxiety Subscale</td>
<td>5.5 (6.1)</td>
<td></td>
</tr>
<tr>
<td>Stress Subscale</td>
<td>9.7 (8.4)</td>
<td></td>
</tr>
</tbody>
</table>

Note: 1 = Less than once a month, 2 = Once a month, 3 = Once a week, 4 = 4-6 times a week, 5 = Once a day, 6 = Greater than once a day. DASS = Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995).

Procedure

Prior to data collection, information and permission letters were sent to the Prison Superintendents and Superintendent of Security (Appendix A). Once permission was obtained, participants were recruited through facilitators of the Think First program who explained the study to the participants, provided them with an information sheet (Appendix B) and obtained informed consent (Appendix C) to engage in the study prior to testing and the commencement of the program. Instructions for the program were read and understood by the participants to ensure informed consent. The researcher was informed of consent confirmation and then commenced data collection with the participants.

Each participant engaged in a Semi-Structured Interview (SSI; Appendix D) and a drug dependency questionnaire (Appendix E). The SSI was used to form a comprehensive profile of participants, and to determine whether participants’ history fitted the DSM-IV criteria for
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substance dependency. Information on the participants’ drug of choice, age at which they began to use substances, patterns of substance use, the quantity and frequency of substance use, periods of abstinence (time, duration, reason), and patterns of substitution (patterns of poly drug use) was collected. The length of time during which participants had used substances was calculated in months. Due to the prevalence of poly-substance use in prison populations, this involved first aggregating the quantity of time each substance was used, from first use tocession, to produce an overall ‘length of substance use’ score. For example, a participant who had begun using cannabis at 10 years and ceased at 11 years (12 months’ cannabis use), who also began using heroin at 15 years until 17 years (24 months’ heroin use) would have a length of substance use score of 36 months. Basic demographic information including name and age, education, mental health (i.e. whether they or their immediate family had been previously diagnosed with any mental health disorders) and medical history (e.g., history of organic brain damage, any medical conditions) was also collected.

Participants were interviewed and tested individually on site by the researcher, who is familiar with working within a custodial setting in a quiet room with limited distractions. A Psychology student was also present during individual data collection. The battery of cognitive and executive functioning measures was administered following a five-minute break after the SSI. In total, each assessment took approximately three to four hours per participant. Scheduled breaks were included to reduce participant fatigue. The scheduled break consisted of two 10-minute breaks, one after the semi-structured interview, and the other half way through the psychometric battery. The battery was administered in the following order: (1) Delis Kaplan-Executive Function System (DKEF) 20 questions (20Q DKEF); (2) Rey’s Auditory Verbal Learning Task (RAVLT); (3) Symbol Digits Modalities Test (SDMT); (4) Digits Forward (DFWD) and Digits Backward (DBWD); Break; (5) Wechsler Test of Adult Reading (WTAR); (6) DKEF- Design Fluency; (7) DKEF Verbal Fluency; (8) DKEF Color-Word Interference
Cognitive and executive functioning domain measures were selected based on their sensitivity for detecting neurocognitive deficits often found in chronic alcohol and drug dependent individuals (Rourke & Loberg, 1996). The measures were selected based on their sensitivity in measuring the following domains: memory and learning, auditory attention, speed of information processing, cognitive flexibility, cognitive shifting, multi-tasking, problem solving, decision-making, verbal fluency, working memory and abstract reasoning.

The battery included an assessment of premorbid IQ, depression, anxiety and stress symptomology and a test to assess motivation. Scores on all the psychometric measures in the battery were converted to standardised scores based upon normative mean and standard deviation, as determined by age and gender according to the manual for each respective measure. As such, age and gender were not controlled for in the analysis. The scores on the decision-making task remained in their raw score format. For a detailed account of each measure, refer to Appendix F.

Each participant’s performance on each task was transformed into a z score based on age-(and gender-) matched normative data. Participants with scores 1.5 SD and below the requisite...
normative mean were considered to have low scores, and were classified as cognitively impaired. High scores were defined as z scores 1.5 \(SD\) above the requisite normative mean.

A measure of clinical meaningfulness (as further explained below) was also utilized alongside any statistically significant results, in order to understand whether there were clinical differences in performance between the prison sample and the comparison groups. Results were considered clinically meaningful if they were more than 1.5 standard deviations from the normative mean.

*Memory and Learning:* Rey’s Auditory Verbal Learning Test (RAVLT) was used as a measure of verbal learning and memory (Rosenberg, Ryan & Prifitera, 1984; Strauss et al., 2006). The RAVLT total score demonstrates high internal consistency (van den Burg & Kingma, 1999) and adequate test-retest reliability over one year for the total and delayed scores \(r = .82\): Strauss et al., 2006).

*Attention:* the Digits Forward test of the Digit Span subtest of the Wechsler Adult Intelligence Scale (3rd ed.) (WAIS II) (Wechsler, 1997) was administered. This test has been shown to be a sensitive measure of sustained auditory attention (Lezak, 2004) and demonstrates sound criterion and construct validity and high internal consistency and test-retest reliability \(r’s > 0.90;\) Wechsler, 2001).

*Speed of Information Processing:* The Symbol Digits Modalities Test (SDMT: Smith, 1991) was administered as the primary assessment for the speed of information processing domain (Lezak, 2004). It is also used to assess attention, complex scanning, and visual tracking. The SDMT manual provides a test for written and verbal conditions. For the sake of brevity, only the written version was used.
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**Working Memory.** The Digits Backwards (DSBW) Test of the Digit Span subtest of the WAIS-III was administered to assess auditory working memory. The DSBW demonstrates sound criterion and construct validity ($r$’s >.09) and high internal consistency and test-retest reliability ($r = .80$) and ($r = .90$) (Lezak, 2004; Wechsler, 2001).

*Cognitive Flexibility, Cognitive Shifting and Information Retrieval.* To assess cognitive flexibility, cognitive shifting and information retrieval, the Verbal Fluency Test from the Delis-Kaplan Executive Function System (DKEFS) was administered. These tests have been shown to reliably measure verbal initiation, speed of processing and simultaneous processing, and provide an indicator of verbal cognitive flexibility, verbal fluency and cognitive shifting (Delis, Kaplan & Kramer, 2001). The verbal fluency subtest is comprised of three separate conditions: Condition 1, phonemic fluency; Condition 2, semantic fluency; and Condition 3, category switching. Overall each condition of the subtest demonstrates sound internal consistency with Cronbach’s alphas ranging from $\alpha = .60$ to $\alpha = .91$ and adequate test-retest reliabilities of $r = .60$ to $r = .90$ according to the test data (Delis et al., 2001).

**Inhibition, Multitasking and Higher-Level Attention.** The Delis-Kaplan Executive Function System (DKEFS) subtest Color-Word Interference Test (CWIT) is considered to be a sensitive measure of the inhibition component in executive functioning and attentional control (multi-tasking) and higher-level attention (Lezak, 2004). The CWIT has moderate to high test-retest reliability with coefficients of .76 for the colour naming condition, .62 for the word reading condition, .75 for the inhibition condition, and .65 for the inhibition/switching condition when re-administered after an average period of 25 ± 12.8 days (Delis et al., 2001).

**Abstract Reasoning and Concept Formation.** The Twenty Questions subtest of the Delis Kaplan Executive Function System (DKEFS) was utilized to measure abstract reasoning and concept formation skills. This test measures the key executive functions of categorical
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processing, abstract thinking and the utilization of feedback for effective strategy use in problem solving. This test has a range of low to high internal consistency and test–retest reliability.

Decision-making performance and risk-taking behaviours were assessed using the computerized version of the IOWA Gambling Task (Bechara, Tranel & Damasio, 2000). There is limited reliability information on the IOWA Gambling Task as it is not a conventional psychometric test (Dunn et al., 2006). Despite this, the IOWA Gambling Task has demonstrated construct validity by detecting decision-making impairments in a wide range of clinical populations with impairments attributable to frontal systems dysfunction in alcoholics (Bechara et al., 2001), depressed individuals (Jollant et al., 2005) and substance users (Quednow et al., 2007).

The IOWA Gambling Task was scored by sampling each set of 20 trials into five blocks. For example, the first block included trials 1 to 20. Scores for each block (net score), were determined by subtracting the total number of cards selected from bad decks (D1 + D2) from the total number of cards selected from good decks (D3 + D4) (Bechara & Damasio, 2002). A total net score was obtained for the entire task by summing net scores for all blocks. A higher total net score indicates a better performance on the task. The dependent variable was the block net scores for each block ((D3+D4) - (D1-D2)).

Estimated premorbid intellectual ability: Wechsler Test of Adult Reading (WTAR: Wechsler, 2001). The WTAR was used to obtain an estimate of premorbid intelligence, as it is considered to be a sensitive measure of premorbid intellectual functioning. This test provides a baseline measure of an individual’s intellectual functioning prior to trauma or disease (Lezak, 2004) and demonstrates sound construct, criterion, and discriminate validity, as well as strong test-retest reliability and internal consistency (all \( \alpha > .90 \); Strauss et al., 2006). An updated
version of the WTAR known as the Test of Premorbid Function (TOPF: Wechsler, 2011) is a superior measure, but was not available at the time of testing.

*Test of Memory Malingering (TOMM: Tombaugh, 1996).* The TOMM was utilized to assess participants’ motivation to put in a good effort on testing (Tombaugh, 1996; O’Bryant, Engel, Kleiner, Vasterling & Black, 2007). The use of Trial 1 has been demonstrated to be an effective option for screening for insufficient effort in psychometric assessments (O’Bryant et al., 2007; O’Bryant et al., 2007).

*Depression, Anxiety and Stress Scale 21 (DASS 21: Lovibond & Lovibond, 1995).* Research has shown that anxiety and depression may affect an individual’s performance on psychometric tests (Lyubomirsky, Kasri & Zehm, 2003; Lovibond & Lovibond, 1995). Psychological distress was measured using the Depression, Anxiety and Stress Scale 21, as it is considered a sensitive measure of current emotional state (Antony, Bieling, Cox, Enns & Swinson, 1998) and a valid measure of depression, psychological tension, agitation and physical arousal. It has a high internal consistency, with Cronbach’s alphas of .82 for the depression scale, .82 for the anxiety scale, and .90 for the stress scale. Cronbach’s alphas for the entire scale are .93 (Henry & Crawford, 2005).

**Results**

The data was subjected to statistical analysis (IBM SPSS 21.0) to compare the prison sample with the normative sample for each psychometric measure, with one other comparison sample drawn from the local community.

Procuring a matched control sample was outside of the scope of the current study, as finding sufficient numbers of non-substance using prisoners was not practical for two major reasons. Firstly, both current and past substance use and substance dependence is high amongst
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prisoners (ABS, 2016; Davidson et al., 2015), making it difficult to procure a matched control sample of prisoners with no substance use history. Secondly, given the time frame of this project, it would have been difficult to find a large enough sample of prisoners who had never used or been dependent on a substance.

The prison sample consisted of 115 (72 male and 43 female) individuals with a mean age of 33.61 years ($SD = 8.64$). The highest level of education attained in the prison sample ranged between 7 and 12 years ($M = 9.6, SD = 1.23$).

Clinical meaningfulness

A measure of clinical meaningfulness was utilized alongside any statistically significant results in order to understand if there were clinical differences in performance between the prison sample and the comparison groups. While the statistical comparisons indicate the statistical significance of any differences between samples, the clinical meaningfulness criterion provides insight into any practical differences in performance. In determining clinical meaningfulness, Strauss et al. (2006) and Petersen and colleagues (2001) suggested that scores within 1 standard deviation or less of the normative mean are too broad and may result in false positives, whilst performances more than 1.5 standard deviations from the normative means are a more sensitive impairment criterion which is less likely to result in false positives. Therefore, performances that were more than 1.5 standard deviations below the normative mean were considered impaired and clinically significant for the purposes of the current study.

Power analysis

Power analyses were conducted using G*Power 3.1.6 (Faul, 2009) for each analysis phase. For Phase 1, each one-sample t-test (two-tailed) required a minimum sample size of 34; Phase 2 required a sample size of 50; and Phase 3 required a sample size of 78 (see Appendix
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

G for calculations), to reach adequate statistical power (0.8) at a medium effect with the alpha level set at .05.

**Hypothesis testing**

Prior to data analysis, assumption testing was conducted. The Shapiro-Wilk statistic indicated that the majority of the data violated normality (sig < .05). However, given that the test is sensitive to small departures from normality and visual inspection of the histograms, Q-Q plots, box and whisker plots, data was considered appropriate for analysis, as any minute violations of normality would not affect obtained p-values.

The statistical analysis comprised three parts to assess each of the three hypotheses:

Hypothesis 1: Raw scores were standardised against each measure’s corresponding normative mean and standard deviation as determined by age and gender. This was to simplify interpretations and comparisons to the requisite normative mean. The first phase of the analysis utilised a series of one-sample t-tests to compare z scores of the performance of prisoners on each psychometric measure (two-tailed comparison) to the requisite normative mean. The percentage of prisoners who fell between the normative means and within 1, 1.5 and 2 standard deviations below the normative means were also calculated to assess the prisoners’ performance across the measures, and to determine the number of prisoners who fell below the normative mean and within 1, 1.5 and 2 standard deviations below the normative mean.

Hypothesis 2: Hypothesis 2 utilised the standardised scores across each psychometric measure as described in Hypothesis 1. Regression analyses were utilised to determine whether there was a predictive linear relationship between each independent variable (first age of substance use, number of substances used, frequency of substance use and total years of substance use) and performance on psychometric measures.
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Hypothesis 3: The third hypothesis of the analysis examined performance on the IOWA Gambling Task and compared the total net scores for the prison sample against the second comparison local community sample’s total net scores (described in Appendix H).

Pre-existing ability

Estimates of pre-existing intellectual ability were assessed through the Wechsler Test of Adult Reading (WTAR). To compare pre-existing intellectual ability in the prison sample with the normative mean on the WTAR, a one-sample $t$ test was computed on the prison sample’s $z$ scores against the normative mean. The prison sample’s mean score of $-0.034$ ($SD = 0.98$) was not significantly different to the mean $z$ score for the normative sample $t(114) = -0.37, p = .71; d = 0.06$, indicating adequate equivalence of pre-morbid intellectual functioning between the two groups. Additionally, Cohen’s $d$ indicated minimal mean differences between the prison sample and the normative population, suggesting low practical differences in ability between the two groups.

Pre-morbid intellectual functioning is a base-line measure of an individual’s intellectual functioning prior to trauma or disease (Lezak, 2004). The WTAR results above indicate that there was no significant difference between the prison and normative samples, suggesting that the prison sample’s premorbid intellectual functioning was comparable to the normative sample, and therefore differences between the samples on the neurocognitive measures can be attributed to alcohol and drug use.

Hypothesis 1: Prison sample performances on psychometric measures compared to normative samples
It was hypothesised that the prison sample’s z score means across each cognitive and executive test would be significantly lower statistically when compared to the relative normative population z score means ($\mu=0$).

To assess whether there were any significant differences between the prison and normative samples on any of the measures, one-sample t-tests were conducted on each domain (see Table 2) between the prison and normative sample. A Sidak Correction was calculated to control for the family-wise error rate and reduce the probability of Type I errors. As such, the alpha level for Phase 1 was set at $\alpha = 0.003$.

Substance-dependent prisoners reported significantly lower scores in the neurocognitive domains of attention, working memory, short term memory, memory consolidation, processing speed, verbal learning, immediate interference susceptibility, cognitive flexibility (1 measure of 3 tested), retrieval of knowledge, inhibition, abstract reasoning, incorporation of feedback and problem solving. Phonemic fluency performance, cognitive shifting, semantic knowledge and two measures of cognitive flexibility failed to demonstrate statistically significant differences between the two groups.

Whilst there were statistically significant differences between the prison sample and the normative sample, the difference on only one measure was considered clinically meaningful (at least 1.5 SDs below the mean) for the whole prison sample. Within the prison sample, Speed of processing was the only measure determined to be clinically meaningful ($t (114) = -17.56$, $p < .001$, $d = 3.29$), demonstrating a large effect size, indicating a large difference between the prison and normative samples (Cohen, 1988), and a high variability amongst the scores ($M = -2.1$, $SD = 1.28$). This shows slower processing speed for the prison sample overall when compared to the normative sample, with the samples’ overall scores deviating at least 1.5 SDs
away from the normative mean. Of the prison sample, 70% of the prisoners scored at least 1.5 SDs or more below the mean (as seen in Table 3).

The variability of scores was explored to determine the proportion of prisoners who fell at least 1.5 SDs below the mean. As can be seen in Table 3, the proportion of prisoners who scored at least 1.5 SDs below the mean ranged from 4.3% for the domain of cognitive flexibility (measured by S/F+E) to 19.1% for the domain of processing speed. A proportion of prisoners scoring at least 1.5 SDs below the mean was represented across each domain.
### Table 2: Prison sample standardized (z) mean scores compared to normative sample mean (= 0) for each psychometric measure

<table>
<thead>
<tr>
<th>Measure</th>
<th>Domain</th>
<th>Mean</th>
<th>(SD)</th>
<th>t value</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFWD</td>
<td>Attention</td>
<td>-.72</td>
<td>(1.00)</td>
<td>-7.67***</td>
<td>0.13</td>
</tr>
<tr>
<td>DBWD</td>
<td>Working Memory</td>
<td>-.92</td>
<td>(.79)</td>
<td>-12.43***</td>
<td>0.17</td>
</tr>
<tr>
<td>DT</td>
<td>Working Memory</td>
<td>-.26</td>
<td>(.79)</td>
<td>-3.31**</td>
<td>0.62</td>
</tr>
<tr>
<td>LNS</td>
<td>Working Memory</td>
<td>-.39</td>
<td>(.91)</td>
<td>-4.57***</td>
<td>0.86</td>
</tr>
<tr>
<td>RAV SD</td>
<td>Short Term Memory</td>
<td>-.63</td>
<td>(1.20)</td>
<td>-5.45***</td>
<td>1.02</td>
</tr>
<tr>
<td>RAV LD</td>
<td>Memory Consolidation</td>
<td>-.73</td>
<td>(1.29)</td>
<td>-6.06***</td>
<td>1.13</td>
</tr>
<tr>
<td>SDMT</td>
<td>Processing Speed</td>
<td>-2.1</td>
<td>(1.28)</td>
<td>-17.59***</td>
<td>3.29</td>
</tr>
<tr>
<td>RAV A</td>
<td>Verbal Learning</td>
<td>-.99</td>
<td>(1.29)</td>
<td>-8.23***</td>
<td>1.54</td>
</tr>
<tr>
<td>RAV B</td>
<td>Immediate Interference</td>
<td>-.71</td>
<td>(.83)</td>
<td>-9.26***</td>
<td>1.73</td>
</tr>
<tr>
<td>VFC1</td>
<td>Phonemic Fluency Performance</td>
<td>-.22</td>
<td>(1.22)</td>
<td>-1.91</td>
<td>0.36</td>
</tr>
<tr>
<td>VFC2</td>
<td>Semantic Knowledge</td>
<td>.18</td>
<td>(1.14)</td>
<td>1.75</td>
<td>0.33</td>
</tr>
<tr>
<td>VFC3 (TC)</td>
<td>Cognitive Shifting</td>
<td>-.23</td>
<td>(1.09)</td>
<td>1.26</td>
<td>0.23</td>
</tr>
<tr>
<td>S/F+E</td>
<td>Cognitive Flexibility</td>
<td>.12</td>
<td>(.91)</td>
<td>1.39</td>
<td>0.26</td>
</tr>
<tr>
<td>S/N+R</td>
<td>Cognitive Flexibility</td>
<td>-.21</td>
<td>(.89)</td>
<td>-2.54</td>
<td>0.48</td>
</tr>
<tr>
<td>CS vs. CF</td>
<td>Retrieval of Knowledge &amp; Cognitive Flexibility</td>
<td>-.35</td>
<td>(1.20)</td>
<td>-3.09***</td>
<td>0.58</td>
</tr>
<tr>
<td>CWIT 4</td>
<td>Inhibition/switching</td>
<td>-.44</td>
<td>(.99)</td>
<td>-4.73***</td>
<td>0.89</td>
</tr>
<tr>
<td>20Qs IAS</td>
<td>Abstract Reasoning &amp; Problem Solving</td>
<td>-.33</td>
<td>(.91)</td>
<td>-4.16***</td>
<td>0.78</td>
</tr>
<tr>
<td>20Qs WAS</td>
<td>Incorporation of Feedback</td>
<td>.23</td>
<td>(.910)</td>
<td>2.77**</td>
<td>0.52</td>
</tr>
</tbody>
</table>


**p<.003 ***p<.001

**Level of neurocognitive impairment in the prison sample**

Table 3 displays the proportion of participants with z scores 0, 1, and 1.5 SDs below the normative means across the psychometric measures administered. Proportions were calculated to determine where the prison group is situated for each measure compared to the general population.

The working memory domain (measured by Letter-Number Sequencing and Digits Total) had the highest proportion of prisoners who performed within 1 SD from the normative
mean followed by cognitive shifting and inhibition. Working Memory (measured by Digits Backwards) followed by Attention had the highest proportion of prisoners within 1.5 SDs from the normative mean. Processing Speed followed by Memory Consolidation and Verbal Learning had the highest proportion of prisoners who performed equal to or greater than 1.5 SDs from the normative mean. This finding implies that the greatest level of impairment in the prison sample was in their ability to process information rapidly, that is, to carry out simple tasks when learning and consolidating newly learned information.

Overall, 55.6% of prisoners scored within 1 SD below the mean, whilst 41.7% of prisoners scored within 1.5 SDs below the prisoner sample mean, and 70% of prisoners scored within 1.5 SDs below the normative mean. This suggests that just under half of the sample of prisoners had scores in the range of borderline impairment on at least one domain, and over three quarters of the prisoners were impaired on at least one domain, with performance equal to 1.5 SDs or below the normative mean criteria. Differences in prisoner and normative sample premorbid IQ scores were not statistically significant $t (114) = -0.372, p = .711$, indicating greater levels of impairment in neurocognitive function within the prison sample compared to the normative community sample.
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Table 3: Proportion of prisoners performing 0, 1 and 1.5 standard deviations below the normative mean on each of the psychometric measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Domain</th>
<th>% of Proportion of sample</th>
<th>% of Proportion of sample</th>
<th>% of Proportion of sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 &gt; SD ≤ 1</td>
<td>1 &gt; SD ≤ 1.5</td>
<td>≥ 1.5</td>
</tr>
<tr>
<td>DFWD</td>
<td>Attention</td>
<td>30</td>
<td>23.5</td>
<td>20</td>
</tr>
<tr>
<td>DBWD</td>
<td>Working Memory</td>
<td>24.3</td>
<td>41.7</td>
<td>16.5</td>
</tr>
<tr>
<td>DT</td>
<td>Working Memory</td>
<td>49.6</td>
<td>20</td>
<td>5.2</td>
</tr>
<tr>
<td>LNS</td>
<td>Working Memory</td>
<td>48.7</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>RAVSD</td>
<td>Short Term Memory</td>
<td>37.4</td>
<td>12.1</td>
<td>22.6</td>
</tr>
<tr>
<td>RAVLD</td>
<td>Memory Consolidation</td>
<td>26.9</td>
<td>13.9</td>
<td>29.6</td>
</tr>
<tr>
<td>RAVB</td>
<td>Immediate Interference</td>
<td>46</td>
<td>18.3</td>
<td>17.4</td>
</tr>
<tr>
<td>SDMT</td>
<td>Processing Speed</td>
<td>15.6</td>
<td>9.6</td>
<td>70</td>
</tr>
<tr>
<td>RAVA</td>
<td>Verbal Learning</td>
<td>34.7</td>
<td>19.1</td>
<td>26.1</td>
</tr>
<tr>
<td>VCI</td>
<td>Initiation/Simultaneous</td>
<td>29.6</td>
<td>21.7</td>
<td>12.8</td>
</tr>
<tr>
<td>VC2</td>
<td>Semantic Knowledge</td>
<td>33</td>
<td>11.3</td>
<td>7</td>
</tr>
<tr>
<td>VC3 TC</td>
<td>Cognitive Shifting</td>
<td>40.8</td>
<td>12.2</td>
<td>12.2</td>
</tr>
<tr>
<td>S/F+E</td>
<td>Cognitive Flexibility</td>
<td>31.3</td>
<td>11.3</td>
<td>4.3</td>
</tr>
<tr>
<td>CS vs. CF</td>
<td>Retrieval of Knowledge &amp; Cognitive Flexibility</td>
<td>36.5</td>
<td>13.9</td>
<td>16.5</td>
</tr>
<tr>
<td>CWIT 4</td>
<td>Inhibition/Switching</td>
<td>40</td>
<td>14.8</td>
<td>13.9</td>
</tr>
<tr>
<td>S/N+R</td>
<td>Cognitive Flexibility</td>
<td>45.2</td>
<td>11.3</td>
<td>9.6</td>
</tr>
<tr>
<td>20Qs IAS</td>
<td>Abstract Reasoning &amp; Problem Solving</td>
<td>55.6</td>
<td>19.1</td>
<td>5.2</td>
</tr>
<tr>
<td>20Qs WAS</td>
<td>Incorporation of Feedback</td>
<td>33.9</td>
<td>6.95</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Note. 0 = Normative Mean Score. DBWD = Digits Backward, DT = Digits Total. LNS = Letter-Number Sequencing. SDMT = Symbol Digit Modalities Test. RAV A = RAVLT A. RAV B = RAVLTB. RAV SD = RAVLT Short Delay. RAV LD = RAVLT Long Delay. VCF1 = Phonemic Fluency Condition 1. VFC 2 = Semantic Fluency Condition 2. VFC 3 (TC) = Verbal Fluency Condition 3 (Total Correct). S/F+E = Design Fluency Switching vs. Filled + Empty Dots. S/N+R= Design Fluency Switching vs. Naming + Reading. CS vs. CF = Category Switching vs. Category Fluency. CWIT C4 = Color-Word Interference Test Condition 4. 20Qs IAS = Twenty Questions Initial Abstraction Score. 20Qs WAS = Twenty Questions Weighted Achievement Score. t = t statistics for relevant one sample t test. *p<.05 **p<.01 ***p<.001

Hypothesis 2: Predictive utility of drug dependence on cognitive impairment

Three multiple regression analyses were conducted to examine whether age of onset, total months used, frequency of use, and the number of substances used could predict levels of cognitive impairment. The measures (1) Category Switching vs. Category Fluency, (2) Verbal Condition 3, and (3) Rey’s Auditory Verbal Learning Test (Long Delay) were chosen as the Dependent Variables, as they best tapped into cognitive ability and what is considered important to function appropriately in daily life, and measure the domains of Retrieval of Knowledge & Cognitive Flexibility, Cognitive Shifting, and Memory Consolidation respectively.
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Before interpreting the results of the regression, assumptions were tested (Normality, Linearity, Multicollinearity, Homoscedasticity, Normality & Linearity of residuals; see Appendix I for assumption testing), with the data being adequate for analysis.

An examination of the models revealed that two independent variables (Age of Onset and Frequency of Use) across the three multiple regression analyses were significant predictors of the dependent variables (See Table 4), with Age of Onset being found to significantly predict scores on Category Switching vs. Category Fluency and Rey’s Auditory Verbal Learning Test (Long Delay), while Frequency of Use significantly predicted scores on Verbal Condition 3 (Category Switching).
Table 4: Unstandardized (B) and standardised (β) regression coefficients, squared semi-partial correlations ($s^{2}$) and (b) percentage of variance for each independent variable on the 3 criterion variables for each hierarchical multiple regression predicting contributing factors in cognitive impairment (n=115)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B [95% CI]</th>
<th>β</th>
<th>$s^{2}$ (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category Switching vs. (Category Fluency)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of Onset</td>
<td>.091 [.024, .159] **</td>
<td>.266</td>
<td>0.06 (6.0%)</td>
</tr>
<tr>
<td>Total Months Used</td>
<td>.000 [.000, .001]</td>
<td>.069</td>
<td>.003 (0.3%)</td>
</tr>
<tr>
<td>Frequency of Use</td>
<td>.047 [-.043, .136]</td>
<td>.096</td>
<td>.009 (0.9%)</td>
</tr>
<tr>
<td>Number of Substances Used</td>
<td>.011 [-.078, .100]</td>
<td>.030</td>
<td>.000 (0.0%)</td>
</tr>
<tr>
<td><strong>Verbal Condition 3 (Category Switching)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of Onset</td>
<td>.056 [-.045, .079]</td>
<td>.056</td>
<td>.002 (0.2%)</td>
</tr>
<tr>
<td>Total Months Used</td>
<td>.000 [-.001, .000]</td>
<td>-.094</td>
<td>.005 (0.5%)</td>
</tr>
<tr>
<td>Frequency of Use</td>
<td>.083 [.000, .165] *</td>
<td>.189</td>
<td>.03 (3.0%)</td>
</tr>
<tr>
<td>Number of Substances Used</td>
<td>.015 [-.067, .096]</td>
<td>.044</td>
<td>.001 (0.1%)</td>
</tr>
<tr>
<td><strong>Rey’s Auditory Verbal Learning Test (Long Delay)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of Onset</td>
<td>-.077 [-.150, -.004] *</td>
<td>-.209</td>
<td>.03 (3.0%)</td>
</tr>
<tr>
<td>Total Months Used</td>
<td>.000 [.000, .001]</td>
<td>.121</td>
<td>.008 (0.8%)</td>
</tr>
<tr>
<td>Frequency of Use</td>
<td>-.024 [-.121, .073]</td>
<td>-.047</td>
<td>.002 (0.2%)</td>
</tr>
<tr>
<td>Number of Substances Used</td>
<td>-.065 [-.161, .031]</td>
<td>-.165</td>
<td>.01 (1.0%)</td>
</tr>
</tbody>
</table>

Note. CI = Confidence Interval. * = criterion variable for each regression analysis.
Note: b = Percentage of unique variance explained by predictor for the specified criterion.
*p<.05 **p<.01 ***p<.001

**Hypothesis 3: IOWA Gambling Task performance analysis**

It was hypothesised that Western Australian prisoners would show significantly lower total scores on the IOWA Gambling Task (measure of decision-making) compared to the Perth community sample.

Prior to conducting the Repeated Measures ANOVA, all net block scores were examined for missing data, general errors, and assumptions of normality. Shapiro-Wilk statistics indicated the assumption of normality was not valid, with visual inspection of the boxplots (see Figure 1) showing outliers present over the majority of blocks across the substance-dependent group and the control group. However, as the skew and kurtosis statistics were in the acceptable
range, and given the generally normal shape of each histogram, the violation of normality was not considered problematic. To maintain adequate statistical power, outliers in the data were retained.
Prior to significance testing, the mean scores were compared across each trial block. The mean net scores from the IOWA Gambling Task initially increased after the first 20 blocks, indicating an increase in performance on making correct decisions, but plateaued for the remainder of the decks. A slight dip is seen between the second and third block, an increase in the fourth block and a decrease in the fifth block. The mean scores differ only slightly, indicating a plateau over time. All net total scores for each block were < 10, indicating that the sample performed below the cut off score for impaired performance (i.e., net score < 10). This may be indicative of a possible association between poor performance in the IOWA Gambling Task and substance dependence. These findings are similar to the results found in Vo’s (2010) study, in which 70% of substance-dependent individuals performed below the cut off score for impaired performance. The findings for this study are shown in Figure 1.
Inferential Statistics

A repeated measures analysis of variance (ANOVA) was conducted to compare performance in the substance-dependent group and the Vo (2010) control group, and across each block on the IOWA Gambling Task (Blocks 1-5).

The assumption of sphericity, as measured by Mauchly’s Test of Sphericity was violated \( (p = .001) \), given that the Epsilon statistics (Greenhouse-Geisser = .903, Huynh-Fedt = .933) did not greatly depart from 1. Although the data did not have a substantial deviation from sphericity (Tabachnick & Fidell, 2013), Huynh-Fedt \( F \)-corrected estimates were used to report the ANOVA results.

Scores on the IOWA Gambling Task increased across each block, indicating that participants performed better as they progressed through the task. Main effect of Block was statistically significant in the ANOVA of \( F(3.73, 624) = 3.76, p = .006 \) (Huynh-Fedt), with significant differences in net block scores across each block. The main effect of Group was also significant, \( F(3.73, 624) = 11.08, p < .001 \) (Huynh-Fedt), showing that the substance-dependent group had statistically significant lower net block scores across each block apart from Block 1 when compared to the control group.

Summary of Results

Hypothesis 1: One sample \( t \) test demonstrated that the prison sample was significantly different from the normative mean on a number of cognitive domains. Speed of processing was the only domain where there was a clinically meaningful difference between the prison sample and the community. On the other cognitive domains, the prison sample mean did not differ greatly from the normative mean. However, the magnitude of variability for each test placed a proportion of prisoners in the clinically meaningful range of at least 1.5 \( SDs \) below the mean.
Hypothesis 2: The regression analyses revealed only two independent variables were significant predictors of scores across the cognitive tests: (1) Age of Onset, and (2) Frequency of Substance Use. Age of Onset was found to significantly predict Retrieval of Knowledge & Cognitive Flexibility (Category Switching vs. Category Fluency) and Memory Consolidation (Rey’s Auditory Verbal Learning Test, Long Delay); while Frequency of Use predicted Cognitive Shifting (Verbal Learning Condition 3, Category Switching).

Hypothesis 3: Results indicated a significant group difference in the IOWA Gambling Task between the prison group and the comparison group, with the prison group scoring lower on the task than the comparison group across each block, with the exception of Block 1.

Discussion

The present study explored the cognitive profile of 115 male and female Western Australian prisoners by measuring cognitive and executive functioning amongst prisoners with a history of substance dependence. Variables such as age of first drug use, number of drugs used, as well as frequency and chronicity of drug use were considered. Age and level of education were also considered as covariates. Performances on psychometric tests across several neurocognitive domains were assessed and the findings are explained below.

Hypothesis 1: The hypothesis was that the prison sample z score means across each cognitive and executive test would be significantly lower statistically than the relative normative population z score means (μ=0). The results demonstrated that Western Australian prisoners with a history of substance dependence tend to display some level of neurocognitive impairment in several of the cognitive domains tested. The largest difference was found between the prison sample and normative group in the domain of speed of processing (Symbol Digit Modalities Test), a sensitive measure of brain injury, with the results indicating that the
prison sample typically processed newly learned information at a slower speed compared to the normative sample.

Compared to the normative population, the prison sample also demonstrated significant cognitive deficits in the domains of attention (measured by WAIS-IV Digits Forward), and working memory (i.e. on WAIS-IV Digits Backward, WAIS-IV Digits Total, and Letter-Number Sequencing). In the domain of memory, as seen on measures assessing immediate and short-term memory (i.e. the short delay condition of the RAVLT) and memory consolidation (i.e. the long delay condition of the RAVLT), the prison sample had significantly lower scores than the normative sample. The prison sample also reported significantly lower mean z learning scores when compared to the normative mean, suggesting that information retention by members of the prison sample was characterized by more intrusions (as seen on the RAVLT A and Interference Test).

For the domain of cognitive flexibility (i.e., Category Switching vs. Category Fluency, and Switching vs. Combined Number and Reading) and cognitive shifting (i.e., DKEF Verbal Fluency Category 3), the prison group performed at a significantly lower level overall when compared to the normative mean. However, within the cognitive flexibility domain, a significant difference in performance between groups was only noted for the Cognitive Switching vs. Category Fluency measure. No significant differences were found for the Design Fluency-Switching vs. Combined Filled Dots and Empty Dot Task (also a measure of cognitive flexibility). It is possible that these mixed findings may be a result of prisoners exhibiting cognitive strengths in tasks requiring basic visual attention (Delis et al., 2001).

The DKEF Twenty Questions-Initial Abstract Score was used to measure domains of abstract reasoning, problem solving, alternative thinking and decision-making. This task requires participants to engage in a process of elimination to identify an unknown object. The
prison sample scored significantly lower than the normative sample on the abstract reasoning and problem-solving domains. These findings support the idea that prisoners do not demonstrate elevated levels of abstract reasoning, resulting in an inability to engage in the level of concrete questioning required to perform well on abstract reasoning and problem-solving tasks. Prisoners may not have a high level of abstract thinking and may not be able to ask highly concrete questions, resulting in the prisoner asking an excessive number of questions, leading to poor performance for abstract reasoning and problem solving.

Despite the differences observed in the majority of cognitive and executive functioning measures, the prison sample did not differ from the normative sample on several verbal fluency domain measures including Phonemic fluency performance (Phonemic Fluency-Category 1) and semantic knowledge (Semantic Fluency-Category 2). This finding suggests that the prison sample may have adequate fundamental verbal skills (i.e., vocabulary knowledge) and the ability to retrieve word-form formation (e.g., rapid retrieval of lexical items) when compared to the normative population.

In addition to comparing the prison sample as a whole to the requisite normative sample, it is essential to consider individual differences in performance on the psychometric measures. General performance across the measures used reflect a wide range of cognitive and executive functioning abilities within the prison sample, indicating that some prisoners did not exhibit cognitive impairment, whereas others demonstrated clear impairment. When prisoners with a varying degree of cognitive impairment enter offender rehabilitation psychotherapy, clinicians need to consider what may or may not be effective for any given individual in a specific intervention. Without considering each prisoner’s cognitive ability, therapeutic outcomes may be difficult or impossible to achieve. Therefore, individually based assessments for prisoners are needed when considering treatment needs and program selection, as one general program
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may not suit every client. Other forms of complementary support for the prisoner based on their cognitive and behavioural profile may need to be offered to achieve successful treatment goals.

In this study, 55.6% of prisoners performed worse than the normative mean on at least one psychometric measure. In some classifications, this is indicative of probable cognitive impairment (Lezak, 2004). However, this cut-off point may be extreme for prisoner samples and may result in increased false positives. Strauss and colleagues (2006) suggest an alternative benchmark of clinically meaningful impairment would be performance recorded as more than 1.5 $SD$s below the normative mean. When this cut-off is applied, between 6.95% and 70% of the prison sample would fall within the definition of clinical impairment on at least one of the cognitive domains tested.

Approximately 41.7% of prisoners experienced difficulties in consolidating information (Working Memory); 23.5% of prisoners experienced difficulties in maintaining attention (DFWD); 13.9% of prisoners experienced difficulty in remembering the right word or recalling a name and remembering it later (RAVL-LD); and at least 12.1% of prisoners found it difficult to remember important information such as appointments, conversations, and recent events (RAVLT-SD). Being unable to make sound decisions, or engage in several steps needed to complete complex tasks was experienced by 12.1% of prisoners, which is clinically meaningful. The area in which the highest proportion of prisoners demonstrated clinically meaningful impairment was on the measure of speed of processing (SMDT), with 70% of the sample producing performances below the 1.5 $SD$s cut-off. This measure of speed of processing is a measure sensitive to brain injury, suggesting that as a result of poly drug use, a significant proportion of prisoners are slower at processing information and less able to manipulate and store information compared to non-substance-dependent individuals.
Overall, these findings suggest that substance-dependent prisoners possess measurable deficiencies in cognitive abilities which may negatively affect their daily life or independent functioning and decrease their ability to engage successfully in treatment intervention.

Furthermore, the present findings indicate that on average, substance-dependent individuals in the prison population function at a lower cognitive level than the general population. Results found 70% of the prison sample tested struggled with performing simple cognitive tasks. Substance dependent prisoners tended to be slower at learning new information, less able to manipulate information in working memory, less able to learn new verbal material, more likely to experience interference when learning new information and to have poorer attention and concentration levels compared to non-substance-dependent individuals. Individuals with a history of substance dependence also found it difficult to complete tasks in a timely manner, switch between different tasks or activities, or think in an abstract way. This is consistent with previous literature demonstrating that substance dependence is associated with widespread neurocognitive impairments (de Sola LLopis et al., 2008; Ersche & Sahakian, 2007; Kalechstein, Jentsch & Kantak, 2008; Kiluk, Nich & Carroll, 2011; Sofuoğlu, Sugarman & Carroll, 2010; Umut et al., 2016; Yücel & Lubman, 2007) especially on tasks that require executive functions (Gonzalez, Bechara & Martin, 2007; Van der Plas et al., 2009; Vo, 2010), learning and memory (Hadjiefthyvoulou, Fisk, Montgomery & Bridges, 2010; Krämer, Kopyciok, Richter, Rodriguez-Fornells & Münte, 2011;) and attention (Madoz-Gürpide et al., 2011).

The results of the current study specifically found that when these domains are impaired, the result may be that individuals are not able to listen and think carefully about something (attention); process and manipulate new information that assists in decision-making (working memory); or convert information into a new memory (memory consolidation). They were also
found to take longer to read material; get distracted easily (susceptibility to interference); demonstrate a decreased capacity to regulate behaviour (inhibition control), reason in a logical way (abstract reasoning) or generate more than one response by weighing up the pros and cons to solve a problem (problem solving).

Hypothesis 2: It was hypothesised that earlier onset, greater frequency, chronicity and number of substances used will significantly predict poorer performance on cognitive and executive measures. This hypothesis was partially supported, as age of initial onset and frequency of drug use were found to predict performance on several measures demonstrating a significant relationship between cognitive and executive impairment, with age of initial onset being the better predictor of the two.

Age of initial onset was found to predict impairments in the prisoners’ performance on a measure of memory (Rey’s Auditory Verbal Learning Test - Long Delay), and on retrieval of knowledge and cognitive flexibility (Category Switching vs. Category Fluency). The findings indicated a statistically significant positive relationship between age of initial onset and cognitive function, with earlier onset of substance use significantly related to reduced cognitive ability in memory, retrieval of knowledge and cognitive flexibility. These findings demonstrate that the commencement of substance use early in life can predict impairments in aspects of memory and deficits in fluency when engaging in tasks that require switching between tasks (cognitive flexibility). Although this is an area of research still in its infancy, previous studies have suggested that the initiation of alcohol and drug use during adolescence (11 to 18 years) leads to enduring deficits in the areas of memory, executive functioning and attention later in life (Brown, Tapert, Granholm & Delis, 2000; Hanson, Cummins, Tapert & Brown, 2011; Squeglia et al., 2009; Wetherill & Tapert, 2013.)
Further exploratory studies using whole brain analysis have found that cannabis use and age of onset were significantly related to cortical activity within the working memory network, suggesting that an earlier start of use (onset before the age of sixteen) produced an increase in activation of the left superior parietal lobe (Becker, Wagner, Gouzoulis-Mayfrank, Spuentrup & Daumann, 2010; Dishion, Felver-Grant, Abdullaev & Posner, 2011; Wetherill & Tapert, 2013). Regression analysis has supported the association between earlier onset of use and increased activity, indicating that the maturing brain might be more vulnerable to the harmful effects of cannabis use (Becker et al., 2010). In the current study, the average age of onset of substance use amongst the prison sample was 11 years (range: 7 – 15 years). These findings suggest that the average prisoner’s brain is more likely to experience cognitive harm during neuromaturation, leading to atypical development in executive functions. This may result in substance dependent prisoners being less likely to retrieve or recall information or memories stored in long-term memory compared to a typically developed individual from the wider community (Fernandez-Serrano, Perez-Garcia & Verdejo-Garcia, 2011; Hester, Lubman & Yücel, 2010; Rueda & Paz-Alonzo, 2013; Verdejo-Garcia et al., 2010).

Frequency of substance use was found to predict prisoners’ performance on executive measures for the cognitive shifting and flexibility domain (Verbal Fluency Total Condition: Category Switching scale). A significant negative relationship was found, indicating that the more often prisoners use substances, the more likely they are to experience impairments in cognitive flexibility and cognitive shifting. Research has demonstrated that frequent substance use is associated with impairments on executive measures (Verdejo et al., 2005; Madoz-Gürpide et al., 2011). Additionally, poor verbal fluency has also been linked to frequency of substance use, as well as lower levels of individual and parental basic education (Latvala et al., 2009). The present findings support previous research that indicates frequency of substance use as a predictor of poorer verbal intellectual ability (Verbal Condition 3 – Category
Switching) in prisoners with a history of substance dependence (Cunha, Nicastri, de Andrade and Bolla, 2010; Verdejo et al., 2005; Madoz-Gúrpide et al., 2011).

**Number of drugs used, and chronicity/length of drug use** did not predict prisoners’ performance on the measures. Previous research has demonstrated that greater cognitive impairment is associated with poly drug use compared to single drug use (Ersche, Clark, London, Robbins & Sahakian, 2006; Ornstein et al., 2000; Simon et al., 2001). This study failed to replicate these previous findings. A possible reason for this is that 99% of prisoners in this study were poly drug users, with only one prisoner who had used only one drug. Past research also suggests that poly drug use compounds and intensifies the impact of single drug use, leading to further neurocognitive difficulties (Madoz-Gúrpide et al., 2011; Schilt et al., 2008; Verdejo et al., 2005). Studies have shown that severe long-term poly drug users demonstrate additional deficits in visual episodic memory, visual working memory and processing speed compared to recreational users; thus, heavier long-term use leads to poorer cognitive ability (Becker et al., 2010; de Sola LLopis et al., 2008). This study shows similar results, given that cognitive impairment was noted on many measures including executive functioning measures.

**Hypothesis 3:** It was hypothesised that WA prisoners would show significantly lower total scores on the IOWA Gambling Task (measure of decision-making) compared to the Perth community sample (Vo, 2010). The final hypothesis findings supported the hypothesis that prisoners with a history of substance dependence would demonstrate significantly lower total IOWA gambling task (measure of decision-making) scores compared to the local Perth comparison group, indicating that substance-dependent prisoners possess poorer decision-making abilities. These results are consistent with previous research which found that substance users are more likely to make maladaptive decisions resulting in long-term losses exceeding
short term gains (Grant, Contoreggi & London, 2000; van der Plas et al., 2009) and are likely to be impulsive (Kjome et al., 2010).

Interestingly, in direct contrast to previous research, the findings indicated that prisoners performed similarly to the local comparison group during the first 20 trials in the gambling task. The comparison group’s performance improved and they shifted their preferences towards good decks and away from bad decks. By comparison, the prison group continually chose bad decks over good decks. Additionally, prisoners took longer to shift to choosing good decks than the comparison group. Towards the end of the task, the prisoners also went back to choosing bad decks. This finding suggests that the prison sample preferred bad decks yielding immediate large rewards despite future losses, implying that these individuals are oblivious to risk, have a greater tendency to maximise reward and minimise the importance of increased risk into the future, demonstrate poorer self-control, are insensitive to punishment or oversensitive to immediate rewards (Bechara & Damasio, 2002) and consequently have poorer decision-making. It is plausible that oversensitivity to rewards may override the reasoning process required for good decision-making, which requires weighing up the pros and cons of each option, establishing goals and assessing the risks of each option (Vo, 2010). Being oversensitive may also indicate a level of impulsivity, difficulties in delaying gratification and a lack of inhibition.

The clinical significance of these findings is apparent. Results support the view that a substantial proportion of prisoners are poly drug users and experience significant problems in their day to day functioning across a wide range of cognitive areas (e.g., decision-making, information processing, remembering tasks that need to be achieved, positive social interactions, problem solving, and emotional regulation, planning, and formulating and carrying out of goals). These difficulties are also likely to disrupt engagement in treatment
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programs (Bates et al., 2006). While the current study attempted to ensure abstinence from substance use prior to administration of the battery of tests, it could not be guaranteed.

Practical applications of the findings

The current findings are clinically relevant in informing future offender rehabilitation by allowing conclusions to be drawn regarding the cognitive profile of Western Australian prisoners. They indicate that the typical prisoner will struggle with learning and consolidating newly learnt information, find it difficult to maintain attention, lack mental flexibility, and demonstrate slower processing speed. As these factors are likely to affect learning capacity, clinicians need to take into consideration the variation in cognitive impairment in their clients, by adapting the content and delivery method to meet the therapeutic and criminogenic needs of prisoners who suffer from cognitive impairments.

To accommodate the needs of cognitively impaired prisoners engaged in treatment programs, some adaptation of traditional content and delivery may need to be considered. For example, this could include repetition of information, allowing additional time to make decisions or additional time to read information more than once, delivering content in ways which address different learning styles, providing written or photocopied notes instead of asking the individual to write notes down, and allowing shorter allocated time slots for activities, for example 20-minute sessions instead of 45-minute sessions.

Limitations

The current findings should be interpreted in light of several methodological limitations. One major limitation of this study was that prisoners were not matched to a control group, as it was difficult to find prisoners who had not used a substance during their lifetime. Due to this lack of a control group, z scores were utilized to reduce variability in the sample, although this
may not have effectively guaranteed group equivalence to the normative population. There are several factors which need to be considered in making inferences from this study.

It is possible that the use of Multiple testing and the Sidak Correction may have led to Type II error. Given that the task orders were not randomised, prisoners may have been fatigued when they neared the end, so poor performance may not reflect poor ability. There was also an assumption that scores on the WTAR were a true measure of intellectual ability before drug use. Other factors that were not controlled for such as cultural differences and socio-economic status may have introduced variables into performance which were unrelated to drug use. These factors need to be considered in future research so the full impact of cognitive function in populations with a history of substance dependence is considered.

Due to the complex nature of a prison population, collecting data was extremely difficult, as their poly drug use history was often severe and long-term, which may have produced errors in prisoners’ recollection and self-reported accounts of their drug use history. Experimenter bias may have influenced drug-reporting patterns where prisoners attempt to present themselves in a positive light to prison staff, in the hope of positive outcomes. Potentially, this may have contributed to results showing that chronicity (length) of substance use and number of substances used did not predict the level of impairment. Potential drug use prior to engaging in the neuropsychological screening versus abstinence for varying periods of time may also have been recalled inaccurately, thus affecting accuracy of the results. To improve accuracy of substance use history, future research could include urinalysis and drug screening to further validate self-reports of drug use, although this could be complicated by questions of prison policy. Additionally, the inclusion criterion ‘not having a head injury’ was based on self-reporting rather than actual medical evidence. Future studies could include tests to
establish the nature and extent of participants’ injuries to improve accuracy of data rather than relying on self-report measures.

The sample consisted of non-Aboriginal offenders as the researchers did not have access to appropriate norms for the indigenous population, therefore the results may only be generalizable to the non-Aboriginal incarcerated population. Future research could consider understanding substance abuse and cognitive functioning across the prison demographic.

**Future Directions**

Approximately 70% of prisoners in this study processed information more slowly than the normative population, and had greater cognitive impairments compared to the general population. This places prisoners at a disadvantage, as learning information when engaging in rehabilitation programs is essential for positive treatment outcomes. Cognitive impairments such as slow processing speed can contribute to learning and attention issues, and can affect executive functioning skills that help prisoners plan, set goals, respond to problems and persist in solving tasks. These skills are considered a prerequisite for engaging in CBT, as indicated in the literature. However, CBT is a key element in all offender rehabilitation programs within Western Australian correctional settings, including criminogenic-specific (e.g., sex offending, drug offending, violent offending), general offending and cognitive skills programs. The Think First cognitive skills program is considered a foundation program and is designed to assist prisoners in learning cognitive skills that are needed to engage in more intensive criminogenic-based programs (e.g., sex offending, violent offending). The role of the Think First program amongst the prisoner cohort in improving cognitive function is explored in Chapter 3. Following this, Study 2 will explore whether prisoners in this study with varying degrees of cognitive impairment benefit from engaging in the Think First treatment program.
Chapter 3: Cognitive Skills Program: Think First

Overview

This chapter provides an overview of Western Australia’s prison-based correctional rehabilitation, with specific attention given to the cognitive skills program Think First. It also provides findings on the effectiveness of the program.

Rehabilitation Programs in Prisons

In the last five years (from December 2011 to December 2016) the number of prisoners in Australia has increased by 36% (10,494 persons), with Western Australia being the largest contributor with 16% or 6,323 persons (Corrective Services, Australia, June Quarter, 2015-2016; ABS, 2016). Recidivism is a contributing factor in increased incarcerations (Department of Corrective Services, WA, 2014), and over the past decade approximately 40 - 45% of prisoners have returned to prison within two years of being released (AIHW, 2015). Recidivism results in increased crime rates, greater harm to the community, more victims and ultimately larger financial burdens on the Government (AIHW, 2015; Hon Joe Francis MLA, Minister for Corrective Services, 2014). Increasing prisoner numbers also put pressure on the prison system through overcrowding (Hon Joe Francis MLA, Minister for Corrective Services, 2014). On average, it costs approximately $120,000 per annum to keep one prisoner in prison. Therefore, reducing the rate of recidivism by preventing re-offending will increase public safety, improve prisoners’ lifestyle and reduce financial costs to the Department (Department of Corrective Services, WA, 2014).

The Department of Corrective Services (WA) has invested significant resources into reducing recidivism and assisting prisoners in adopting a law-abiding lifestyle (Heseltine, Sarre & Day, 2011; Wormith, et al., 2007). One such area of investment is offender rehabilitation programs. However, the intended outcomes of reduced recidivism are not being adequately
achieved (Hon Joe Francis MLA, Minister for Corrective Services, 2014). A review of the
Department of Corrective Services (WA) conducted by the WA Inspector of Custodial Services
in 2014 identified that individual needs are not being met through tailoring therapeutic
programs to individual prisoners and their cognitive functioning, or by taking cognitive
impairments into consideration (Hon Joe Francis MLA, Minister for Corrective Services,
2014). This finding aligns with the Risk-Need-Responsivity principle, and particularly
responsivity as discussed in Chapter 1.

Within the prison system, offender rehabilitation programs include a broad array of
Services (Hon Joe Francis MLA, Minister for Corrective Services, 2014) highlighted the
following programs currently available to prisoners:

- prison-based educational and vocational training programs;
- prison-based employment programs;
- prison-based group treatment programs (e.g., cognitive skills, drug treatment,
  sex offending, violent offending);
- post-release services that aid community re-integration;
- drug courts; and
- mental health diversionary programs.

These programs broadly aim to provide prisoners with skills to enable them to live a
prosocial lifestyle and reduce their likelihood of reoffending. In order to explore offender
rehabilitation, the effectiveness of prison based group treatment programs will be discussed
below.
The efficacy of offender rehabilitation treatment programs can be measured according to the rate of recidivism (Heseltine et al., 2011; Howells, Heseltine, Sarre, Davey & Day, 2004; Wilson, Bouffard & MacKenzie, 2005). Interventions most effective at reducing recidivism are those which are grounded in the principles of the Risk-Need-Responsivity model (Andrews & Bonta 2006, 2010), which emphasises behavioural treatment tailored to the individual’s learning style, cognitive capabilities, motivation, personality and cultural background.

Meta-analytic research conducted by Andrews and Bonta (2010) found that greater adherence to the Risk-Need-Responsivity principles in programs resulted in greater reductions in recidivism among prisoners in general (Andrews & Dowden, 2006; Landenberger & Lipsey, 2005; Oliver et al., 2011). Although research has shown that adherence to such principles results in a reduction in recidivism, these findings appear to be neglected in practice in Western Australia, according to Hon Joe Francis MLA, WA Minister for Corrective Services (2014). For example, prisoners have been found to be allocated to unsuitable treatment programs, or have been placed in programs when they are not treatment-ready or have low motivation, potentially due to overcrowding, inaccurate treatment assessments and potentially high demand for programs. These factors contribute to an increase in prisoner recidivism statistics. As mentioned previously, in 2014, 40 percent of prisoners re-offended over the course of two years (Hon Joe Francis MLA, Minister for Corrective Services, 2014).

Offenders are allocated to programs which focus primarily on their offending behaviours, that is, the offences they have committed. The suite of offender programs is vast, and includes specific programs such as sex offender, violent offending, general offending and cognitive skills programs, all of which are based on the principles of CBT.

CBT is considered the most effective therapeutic framework for prison programs and specific programs adapt components of the CBT model to address prisoners’ antisocial
cognition and dysfunctional thinking patterns which have contributed to their criminal behaviour. In addition, these programs assist individuals to increase their awareness of particular problematic thought processes and behaviours, in order to actively change in a positive way (Andrews & Bonta, 2010; Andrews & Dowden, 2006; Justice Action, 2012). CBT interventions in correctional populations centre on building healthy coping skills, positive problem solving and cognitive restructuring of negative or unhelpful thought processes (Justice Action, 2012; Meichenbaum, 1995; Pearson & Lipton, 1999). CBT approaches focus on improving deficits in interpersonal problem-solving, critical reasoning and planning skills and developing the ability to adapt to stressful situations (Justice Action, 2012; Wilson et al., 2005). CBT places an overarching emphasis on learning, practicing and rehearsing new skills. This approach allows prisoners to master and reinforce a new skill, ideally resulting in more prosocial, non-offending behavioural patterns.

Utilizing a CBT model in group therapeutic programs has been recognised as the most effective means of delivering rehabilitation to prisoners, with a large body of research supporting the benefits of CBT interventions with this population (Andrews & Bonta, 2010; Andrews & Dowden, 2006; 2015; Community Development & Justice Standing Committee, 2010; Landenberger & Lipsey, 2005; Lipsey et al., 2007; Wilson et al., 2005; Zajac, 2015). CBT group interventions in correctional settings feature highly structured and manual-based treatment programs delivered by two facilitators to a group of 10 – 12 prisoners in a classroom-like setting (Dobson & Khatri, 2000; Justice Action, 2012).

The present study focuses on one particular cognitive program available to prisoners in Western Australia; the Think First Program (McGuire, 2005). This program was chosen due to its targeting of cognitive functioning to improve treatment outcomes (as discussed in Chapter 2), as well as its availability and accessibility within the prison system. The overarching aim
of Think First (TF) is to assist prisoners in developing and mastering skills in a general non-offence-specific program prior to engaging in a more intensive criminogenic-specific need based program. Therefore, it is important to examine whether the Think First program is valid in its delivery and efficacy in assisting individuals to enhance general cognitive skills which are then transferable to a more intensive program.

**The Think First Program**

The Think First program was originally developed in the UK by James McGuire (2005) as a general offending group work program. The program has since been adopted throughout the corrections system in Australia, both in community and prison populations (Heseltine, Sarre & Day, 2011). The program is based on cognitive behavioural principles which address prisoners’ social cognitive skills, with a focus on how skills like interpersonal problem solving, self-control and perspective taking are relevant to their offending behaviour (Heseltine et al., 2011; McGuire, 2002, 2005; Palmer et al. 2007). It is considered a foundation program which teaches prisoners basic cognitive skills that will assist them to ‘acquire, develop and apply a series of social-problem solving and allied skills that will enable them to manage difficulties in their lives, and to avoid future re-offending’ (McGuire, 2005, p. 187).

The Think First program was introduced into Western Australian prisons in 2005 (Palmer et al., 2007), and consists of a 60-hour program, delivered over 30 sessions, with each session lasting two hours. The sessions are sequential, with sessions 1 to 15 directed at teaching basic problem-solving skills. Sessions 16 to 30 of the program addresses skills in self, stress and anger management, perspective-taking, conflict resolution and social interaction (McGuire, 2005). Approximately one third of the program is designed to develop cognitive skills.
Evaluations of the Think First Program

A preliminary evaluation of Think First conducted on 220 sentenced prisoners in the English and Welsh Probation Service found significant changes in cognition, particularly in attitudes towards crime from pre-program to program completion, (McGuire & Hatcher, 2001). Bartholomew and Aurora (2001) built upon these findings and noted that the incarcerated sample in Victoria’s maximum-security prison demonstrated positive changes on measures of locus of control, general attitudes towards offending, anticipation of re-offending, victim empathy and perspective taking. However, their findings also indicated that prisoners continued to have high impulsiveness scores and careless decision-making style scores post-program completion.

A longitudinal study conducted by the New South Wales Department of Corrections between 2003 and 2007 found support for the program’s efficacy among a sample of 135 incarcerated male participants. Four questionnaire measures (i.e., the Social Problem-Solving Inventory-Revised; Barrett Impulsivity Scale, Version II; Locus of Control Behaviour Inventory; and Crime PICS Version II) were administered before and after prisoners completed the Think First program. Post program scores on a range of tests improved after the prisoners completed the program, with prisoners showing reduced motor, cognitive and non-planning impulsivity levels, improved rational and social problem-solving skills, and changes in general attitude towards offending. These findings suggested that the Think First program influenced a positive attitude change towards prosocial behaviour and increased insight into the impact their offending behaviour had on others. High levels of internal locus of control were found among the participants post-program completion. Despite the positive change, they also found increased impulsivity post-program in specific problem-solving style contexts, yet reduced internal and cognitive impulsivity (Burgoyne & Tyson, 2013). Possible explanations included an increase in participants’ confidence in their problem-solving ability (given that problem
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solving decisions are made even more quickly post-program) or the difficulty of carrying out reliable self-report measurements of impulsivity (Ireland & Archer, 2008, cited in Burgoyne & Tyson, 2013, p. 93-97).

The Think First program has been shown to positively shift prisoners’ perceptions of their ability to solve challenging tasks, stop and think before acting impulsively and consider others (Heseltine et al., 2011; McGuire, 2002, 2005). The program has also been shown to enhance cognitive skills such as coping and interpersonal problem-solving skills in prisoners (McGuire, 2002, 2005). However, what remains unknown in the literature is whether prisoners with cognitive impairments are able to benefit from a general offender rehabilitation program such as Think First, and whether these cognitive impairments may interfere with other predictors of treatment outcomes, such as self-efficacy.

The current research explored the cognitive profile of a sample of Western Australian prisoners in Study One, with results indicating that 70% of prisoners were impaired on at least two neurocognitive domains. In addition, initial age of onset and frequency of substance use were found to predict levels of cognitive impairment on measures of memory consolidation and processing speed. Previous research on the impact that predictors of treatment outcome such as cognitive impairments and self-efficacy may have on prisoners engaging in the Think First program suggests the program is effective amongst prisoners. Study 2 examines self-efficacy as a predictor of Think First Program treatment outcome. Additionally, this study investigates whether prisoners with cognitive impairment benefit from engaging in the Think First program and whether these impairments interfere in the relationship between self-efficacy and treatment outcome.

Whilst research has shown positive outcomes amongst prisoners who engage in the Think First program, limited research currently exists on the impact which cognitive impairments
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may have on one of the program’s treatment outcomes, namely self-efficacy. Therefore Study 2 examines self-efficacy as a criterion for treatment outcomes, and also explores whether prisoners with cognitive impairment benefit from engaging in the Think First program, and whether these impairments interfere in the relationship between cognitive functioning and self-efficacy.
Overview

The cognitive profile of Western Australian prisoners examined in Study 1 provides insight into the proportion of prisoners with cognitive and/or executive impairment. The findings indicate that over three quarters of prisoners were cognitively impaired on at least one neurocognitive domain measured. Overall, the findings found that approximately 70% of prisoners scored two standard deviations below the normative mean for speed of processing. Statistics such as these are concerning for clinicians working in corrections facilities, as prisoners are required to engage in offender rehabilitation programs which assume proper cognitive functioning. Offender rehabilitation offers several opportunities, including psychotherapeutic programs which are primarily designed to teach prisoners how to think and behave in a prosocial manner to prevent further recidivism. However, cognitive functioning is only one predictor of offender rehabilitation. Another factor is self-efficacy, which throughout the research on drug and alcohol studies has generally been associated with positive treatment outcomes. Self-efficacy, regardless of how high or low at the beginning of treatment, appears to shift through cognitive therapy, as suggested in a number of studies (Bandura & Locke, 2003; Kadden & Litt, 2011; and others, e.g. Longabaugh et al., 2005; Martinez et al., 2010).

Introduction

Prisoners who have complex drug dependencies pose a continuing challenge for the criminal justice system (Sweeney & Payne, 2011), as this cohort has poor program retention rates and higher post–program reoffending rates compared to prisoners who are not substance users (Day, Bryan, Davey & Casey, 2006; Sweeney & Payne, 2011). Poor program retention rates and increased reoffending rates are often an indication that offender rehabilitation
programs are not meeting the WA Department of Corrective Services’ primary objective of reducing recidivism, which is often used as a measure of the overall success rate of rehabilitation programs (Sweeney & Payne, 2011). Several factors have been found to contribute towards offenders benefiting from treatment programs. The Risk-Need-Responsivity principle was designed to guide offender rehabilitation and take into consideration individual barriers such as age, level of education, drug and alcohol problems, cognitive functioning, lack of motivation, treatment readiness and lack of confidence (Evans, Li & Hser, 2009; Ogloff, 2002; Oliver et al., 2011).

As mentioned above in Study 1, one of the barriers to prisoners benefiting from an offender rehabilitation program is compromised cognitive function (Evans et al., 2009; Ogloff, 2002; Oliver et al., 2011) and yet previous research has indicated that cognitive and executive functioning is a predictor of positive treatment outcomes and is crucial to learning, interpreting and applying newly learned information when engaging in rehabilitation (Aharonovich et al., 2006; Passetti et al., 2008; Teichner et al., 2002). In Study 1, a sample of 115 male and female Western Australian prisoners with a history of substance dependence were administered a neurocognitive test battery. Findings indicated that the prison sample had significantly lower functioning compared to the normative population in several neurocognitive domains, including attention, working memory, short term memory, memory consolidation, processing speed, abstract reasoning, and problem solving. Nonetheless, as would be expected, there was variability within the sample’s performance on the tasks, with some prisoners exhibiting cognitive impairment, whereas others demonstrated normal functioning. That is, approximately 55.6% of prisoners were found to have borderline impairment, with scores within 1 standard deviation below the mean, in domains that measured problem solving. Almost half the sample (41.7%) were mildly impaired on a measure of working memory, with scores between 0 and 1 standard deviation below the mean.
Many aspects of cognitive function were shown to be problematic in this sample, but speed of processing (Catts, Gillispie, Leonard, Kail & Miller, 2002) and memory consolidation were the two functions in which the greatest proportion of prisoners were severely impaired. Of significance, however, was that approximately 70% of prisoners were severely impaired (1.5 or more standard deviations below the mean) in the domain of speed of processing, and 29.6% of prisoners scored in the severely impaired range on the measure of memory consolidation (see Table 3). Whilst both of these cognitive domains play a considerable role in learning (Catts et al., 2002), speed of processing is not a strong predictor of how quickly someone is likely to learn a new skill. However, once a skill and task has been learned, speed of processing (how quickly a person can carry out a task) becomes a good predictor of how quickly and accurately the individual can perform the skill (Lichtenberger, Mather, Kaufman & Kaufman, 2012).

The above findings are similar to those in a recent systematic review which compared a prison population to non-prison controls (Meijers et al., 2015). This review found executive functioning impairments in the general prison population compared to the normative population in attention, cognitive shifting, working memory, impulse control and problem solving.

Cognitive Functioning and Learning

Cognitive functions play a role in learning, remembering, solving problems, paying attention and many other tasks from the simplest to the most complex. They are used to understand and integrate information in a meaningful way (Berens, 1999). As discussed in Chapters 1 and 2, cognitive functions consist of several processes such as attention, language and memory that lead directly to obtaining information and thus knowledge. Executive functions are a set of higher order processes that help govern other skills and provide a mental
framework essential to learning (Aharonovich et al., 2006; Bates et al., 2006; Teichner et al., 2001). A core component of rehabilitation is learning, which is the process of acquiring new, or, modifying and reinforcing existing knowledge, behaviours, skills, or values, which may lead to changes in attitude, behaviour or cognition. The cognitive processes that underpin learning include memory consolidation, memory capacity, and problem-solving ability (Aharonovich et al., 2006; Bates et al., 2006; Catts et al., 2002).

As mentioned above, a sample of prisoners presented in Study 1 was found to be severely impaired in the domains of speed of processing and memory consolidation. Whilst not dismissing the importance of all cognitive functions in the process of learning, processing speed has been proposed to be a key cognitive component that supports executive functions (Tanner, 2009; Takeuchi & Kawashima, 2012). Processing speed refers to the amount of information that can be processed within a certain period of time and the time required to process a certain amount of information (Chiaravalloti et al., 2015; Kalmar & Chiaravalloti, 2008). Processing speed influences many cognitive functions that are crucial in almost all learning activities, including listening and absorbing new information and reading learning materials (Chiaravalloti et al., 2015). It also affects social functioning, playing an important role in social relationships (friendship), routine, and social skills. With poor processing speed, individuals may struggle to express themselves in fast-moving conversations, as they are so busy working out what has been said they do not have the ability to respond. This too may affect the rehabilitation process (Chiaravalloti et al., 2015).

Memory consolidation is a learning mechanism that is essential for long-term memory, and refers to a process of neural plasticity occurring over several hours following learning of new information, during which fragile memory traces become stabilised in long-term memory (Cocenas-Silva et al., 2014; Dudai, 2004; 2012). Thus, memory traces consolidate slowly over
Cognitive functioning and self-reported self-efficacy in prisoners with a history of substance dependence

Memory consolidation is an important skill known to relate to successful completion of tasks, effectively following rules, and utilising previously learnt information in new challenging situations. Thus, memory consolidation is a fundamental cognitive process that is of high importance for researchers trying to model future prisoner treatment outcomes, and is thus a factor which influences overall recidivism.

According to Salazar and Centeno (2015) and Delors (1996), there are four basic learning principles: 'learning how to know, learning how to do, learning how to live and learning how to behave in a social context' (Salazar & Centeno, 2015; p. 59). The first principle: 'learning how to know' implies that the individual has adequate cognitive skills and resources such as memory, attention, capacity to focus, control of own impulses, ability to motivate oneself, language skills, and the ability to utilise additional brain functions to grasp and apply newly learned information logically (Salazar & Centeno, 2015). The second principle: 'learning how to do', implies the development of competencies such as conflict solving, problem solving, making decisions and analytical and critical thinking (Salazar & Centeno, 2015). The third principle: 'learning how to live', is the integration of the two previous principles into an individual’s surrounding environment, which then leads them to live a prosocial lifestyle. The final principle discussed by Salazar and Centeno (2015), ‘learning how to behave in a social context’, relates to belonging and feeling connected with one’s social circle. This can be fostered by the therapeutic alliance between a participant and a clinician in a therapeutic context.

Learning how to know implies that the individual needs to acquire a high degree of independence and a better ability in problem solving and decision-making. Therefore, in the rehabilitation process, assisting and providing guidance and skills to individuals to solve problems and to make sound decisions by themselves will increase their self-confidence as well as their self-esteem and self-efficacy. Learning how to do requires individuals to develop skills
such as learning and mastering the skills required to understand and resolve a conflict, learning how to communicate in a prosocial manner and learning how to think and behave differently during rehabilitation (Salazar & Centeno, 2015). Learning how to live implies being able to think and behave differently from how the individual has done in the past, enabling them for example to live a better drug-free and crime-free lifestyle. The fourth fundamental principle - learning how to behave in a social context - implies that engaging in rehabilitation will foster a positive environment which promotes and encourages a new way of behaving. These four principles are aimed at providing individuals with new ways to learn self-awareness and engage in change, whilst being aware of and identifying the causes and consequences of their actions. Learning how to know, how to do, how to live and how to behave in a social context can provide prisoners with the skills, knowledge, confidence in their ability, and motivation to react in a more positive social manner to challenging situations. It can offer them the skills necessary to function well in normal daily activities, and live with increased quality of life, self-efficacy and self-worth. By reducing potential negative affects which prisoners associate with their ability to change, they will be less likely to live an antisocial lifestyle once re-integrated into the community.

Research indicates that compromised cognitive and executive functions can affect an individual’s ability to benefit from rehabilitation (Hart et al., 2012; Passetti et al., 2008; Simon et al., 2001; Verdejo-García, López-Torrecillas, Giménez & Pérez-García, 2004). These impairments can affect an individual’s ability to engage in future learning that may result in positive behaviour change. During rehabilitation, compromised cognitive processes may affect an individual’s ability to:
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- set goals, complete tasks, maintain attention, develop coping skills, remember and integrate new information (Aharonovich et al., 2006; Day, 2009; Goodkind et al., 2015; Teichner et al., 2001);
- regulate emotions (Lynch, Chapman, Rosenthal, Kuo & Linehan, 2006);
- stop and think without acting on impulse (Czapla et al., 2015);
- adhere to group rules and complete tasks (Simon, Yokomizo & Bottino, 2012);
- take social cues, speak appropriately and interact with people appropriately (Simon et al., 2012);
- respond in a timely manner to questions and keep appointments (Simon et al., 2012);
- be motivated to engage in therapy (Copersino et al., 2012); and
- benefit from rehabilitation (Morgenstern & Bates, 1999).

Results obtained in Study 1 highlight an important subgroup of prisoners who demonstrated significantly impaired performance across cognitive domains that are responsible for learning new information. Of interest in Study 2 is the influence these domains may have on this subgroup’s motivation to complete assigned tasks. Motivation is a complex construct and is often linked to the success of psychosocial interventions (Medalia & Saperstein, 2011). It is also considered an essential aspect of prisoner rehabilitation (Jang et al., 2015; Morgenstern & Bates, 1999) as the primary aim is for them to learn healthy ways to think and behave when they are in the community, to prevent further reoffending.

Motivation

Individuals learning within a prison environment are often faced with stressors at a level higher than learning environments outside the confines of prison (Desir & Whitehead, 2013). One of those stressors is mandatory attendance and participation in offender rehabilitation
programs (Desir & Whitehead, 2013). Another stressor is the limited incentives for the prisoner to participate in rehabilitation (Geraci, 2002). Parole can be viewed as an extrinsic motivator, which may initially ignite motivation, but which is unlikely to sustain motivation in the longer term, and is often short lived (McMurran, 2002; Reiss, 2012). Intrinsic motivation is more likely to last and contribute towards durable positive life changes (McMurran, 2002; Olson & Weber, 2004; Reiss, 2012).

Both intrinsic and extrinsic factors play a significant role in motivation. Whilst extrinsic motivation can foster change (McMurran, 2002; Olson & Weber, 2004; Reiss, 2012), research suggests that intrinsic motivation is often needed to engage in learning (McMurran, 2002; Olson & Weber, 2004; Reiss, 2012). A systematic review of motivation found several key factors that are essential to the construct of motivation (Jang et al., 2015). These factors included:

- attitude: an individual’s feeling towards engaging in or avoiding an activity;
- interest in doing the activity;
- value or importance placed on the activity;
- self-efficacy: an individual’s judgement of his or her ability to accomplish the activity;
- self-concept: an individual’s overall self-perception and sense of competence in relation to the activity; and
- goal: the primary reason why the individual is engaging in the activity.

Jang and colleagues (2015) as well as Schunk and Zimmerman (2007) have identified self-efficacy as central to motivation. Self-efficacy refers to individuals’ perception of their ability to succeed in specific situations, or accomplish a task, and plays a significant role in
how they approach tasks, goals and challenges (see Chapter 1). Miller and Rollnick’s (1998) theory of motivation also implies that an individual must be ‘able’ before they are ‘willing’ and ‘ready’ to engage in change (Hollin & Palmer, 2009). ‘Ability’ here not only suggests that cognitive functioning is essential to therapeutic success, but that one’s own judgement of one’s capacity to engage in therapy is also important (Kelly & Greene, 2014).

Indeed, social cognitive theory argues that cognitive processes, behavioural and environmental factors interact to determine one’s level of motivation and goal directed behaviours (Crothers, Hughes & Murine, 2011). Self-efficacy develops from self-perception and experiences of external social factors (Bandura, 1977; 1986; Luszczynska & Schwarzer, 2005). When applying this theory to human behaviour, people with high self-efficacy (that is, those who believe they can perform well) are more likely to face a difficult task as something to be mastered rather than something to be avoided. Therefore, by extension, people with low self-efficacy are more likely to avoid tasks and give up easily (Csikszentmihalyi, 1997).

In regard to treatment outcome, according to Bandura (as cited in Jongen et al., 2015, p. 2), individuals with low self-efficacy at the beginning of treatment will tend to avoid tasks, are less likely to make the effort to complete a task or activity, and tend to believe that tasks are harder than they actually are, resulting in poor treatment outcomes compared to those with high self-efficacy. Individuals with high pre-treatment self-efficacy tend to benefit more from treatment because they tend to take on challenging tasks, are more likely to make effort to complete a task or activity and persist longer in the effort required (Bandura, 1986; Bates, Pawlak, Tonigan, & Buckman, 2006; Litt, Kadden & Petry, 2013).

According to Nash, Ponto, Townsend, Nelson and Bretz (2013), self-efficacy in general can change between pre-treatment and post-treatment in response to various psychotherapeutic interventions. In particular, CBT has been shown to generate shifts in self-efficacy associated
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with activities such as: experiencing mastery, learning from others (role-play, modelling), receiving social persuasion and learning how to cope with physiological stressors. As discussed in Chapter 1, CBT is generally the underlying approach adopted in offender rehabilitation programs, with research providing evidence that this method produces positive outcomes amongst prisoners (Andrews, Bonta & Wormith, 2006; Andrews & Bonta, 2010). CBT has generally showed improved performance in rehabilitation programs, as people are encouraged to tackle challenges and to gain the experience that may lead to an increase in self-efficacy and motivation (Csikszentmihalyi, 1997; Medalia & Saperstein, 2011). This suggests that mastery of skills may be an important factor that enhances self-efficacy, although it is not clear whether this can be expected in prisoners with varying degrees of cognitive function, and whether post-treatment self-efficacy changes are due to changes in cognitive functioning.

Self-efficacy and Treatment Outcomes

As discussed previously, self-efficacy is a concept first introduced by Bandura (1977). Self-efficacy is defined as ‘beliefs in one’s capabilities to organise and execute the courses of action required to produce given attainments’ (Bandura, 1977, p. 3). These beliefs can influence people’s behaviour either positively or negatively, based on their perception of their abilities concerning a given task (Bandura, 1977; 1986; Hall & Vance, 2010; Jongen et al., 2015; Ormrod, 2013). Research has shown that self-efficacy can affect how individuals approach learning tasks, and is therefore influenced by cognitive ability. As such, it is considered a predictor of treatment outcome in alcohol and drug use rehabilitation (Adamson et al., 2009; Franckowiak & Glick, 2015; Kelly & Greene, 2014; Hall & Vance, 2010; Luszczynska, 2004; Randall et al., 2003).

Some studies have examined whether cognitive interventions increase self-efficacy and thereby improve an individual’s ability to benefit from rehabilitation. Cognitive therapy is
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based on mastering cognitive skills such as coping strategies (Majer et al., 2003; Walton et al., 2003) and goal-setting skills (Borrelli & Mermelstein, 1994; Lozano & Stephens, 2010). This therapeutic approach has been shown to increase post-treatment self-efficacy (Ilgen, Tiet, Finney, & Moos, 2006). Individuals with higher self-efficacy are therefore more likely to use more effective learning strategies (Hall & Vance, 2010).

Hyde, Hankins, Deale and Marteau (2008) conducted a literature review on treatments that enhance self-efficacy post-treatment. They found ten studies that measured self-efficacy at both pre- and post-intervention amongst tobacco, drug and alcohol addicted people. Although seven of the ten studies found an increase in post-treatment self-efficacy, the effects were produced by a range of different interventions used across the studies. Other studies found that specific treatment-related activities promoted changes in self-efficacy. For example, Borrelli and Mermelstein (1994) and Lozano and Stephens (2010) found that the more goals set and achieved though therapy, the higher the individual’s self-efficacy post-treatment. Similarly, Ilgen, McKellar and Moos (2007) found that if the individual participated in skills building such as coping strategy activities, higher post-treatment self-efficacy was observed. In a study comparing four treatment approaches for marijuana dependence (Kadden et al., 2007; Litt et al., 2008), the duration of continuous abstinence over a one-year period was best predicted by self-efficacy at post-treatment ($r = .255; p<.01$), and this was a better predictor than abstinence during treatment. This finding provides support for the notion that an increase in the use of appropriate coping skills is likely to be accompanied by an increase in self-efficacy. However, researchers in both studies did not discuss how pre-treatment self-efficacy was accounted for, so the extent of the predictive utility of coping skills on self-efficacy is not clear.
Law and Guo (2015) conducted a recent study of female prisoners with a history of substance dependence who engaged in a 12-session drug therapy program. They aimed to enhance female prisoners’ self-efficacy by helping them to learn to make appropriate choices, develop coping strategies and make effective plans to fulfil their needs. Findings indicated that there were significant differences between pre- and post-test scores for self-efficacy, and high post-test scores were found for decision-making, action-planning, coping and social skills. Despite these findings, participants’ pre-test self-efficacy was not clear. Research is needed to clarify the role of any changes in self-efficacy due to the adoption of CBT, and whether it can promote positive health and behavioural outcomes in prisoners.

An abundance of evidence suggests that if an individual is taught coping skills (i.e., problem-solving, decision-making and social skills) and is given the opportunity to practice these skills through interventions like CBT, then they are more likely to master the skills that generate changes in self-efficacy between pre- and post-intervention (Allsop et al., 2000; Longabaugh et al., 2005; Martinez et al., 2010). Most research in this field, however, is predominantly on self-efficacy and treatment outcomes amongst tobacco, drug and alcohol dependent people. Limited attention has been given to the role cognitive functioning may play in self-efficacy. Kadden and Litt (2011) noted that the relationship between cognitive functioning, self-efficacy and treatment outcomes warrants further research to inform psychological intervention.

Self-efficacy, Cognitive Function and Treatment Outcome

Conceptual frameworks have been developed for understanding the impact of cognitive impairment on treatment outcomes in people who engage in therapy for alcohol addiction (Bates, et al., 2006). Within these frameworks, Bates et al. (2002) proposed five alternative models to illustrate how neuropsychological information can affect addiction treatment
outcomes when evaluated in relation to environmental features and intrapersonal capabilities (Bates et al., 2006). Three of the models are illustrated in Figure 1: the A, B, and C models. Model A suggests that cognitive impairment directly increases the likelihood of poor treatment outcomes, as consistently supported by previous research explored in Chapters 1 and 2. In Model B, the impairment affects change mechanisms, and these mechanisms directly influence treatment outcomes, although importantly, there is no direct relationship between impairment and treatment outcome. Model C suggests that cognitive impairment influences treatment outcome by affecting the environment and intrapersonal factors which may act as change mechanisms (Bates et al., 2006).

Models B and C illustrate indirect paths that can exist between variables (Bates et al. 2006; Kraemer, Wilson, Fairburn & Agras, 2002; MacKinnon, Lockwood, Hoffman, West & Sheets, 2002). The aim of the present study, in line with Model C, was to explore the relationship between cognitive functioning and self-reported self-efficacy, with cognitive functioning considered to be a predictor of self-efficacy after the completion of therapy. Self-
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efficacy is considered the centre of motivation and can sustain behaviour change, because it can influence an individual’s behaviour either positively or negatively, based on their perception of their abilities in relation to a given task (Bandura, 1977).

Bates and colleagues’ (2002) framework was again utilised in the study by Bates and colleagues (2006), in which direct, mediated, and moderated pathways between cognitive impairment, therapeutic processes (treatment compliance, self-efficacy, treatment readiness) and treatment outcome (alcohol and drug use) were examined. Secondary analysis from 1,726 outpatients who met a diagnosis of alcohol or drug abuse or dependence were assigned to one of three interventions (CBT, 12-step facilitation or motivation enhancement therapy). Bates and colleagues (2006) focused on paths from cognitive impairment at treatment entry to treatment process, and from treatment process to treatment outcome. Findings indicated that greater neurocognitive impairment predicted less treatment compliance and lower self-efficacy, as measured by an individual’s ability to abstain from drinking. They also found that self-efficacy at the end of treatment had a moderate effect size on drinking outcomes. Specifically, those with higher self-efficacy reported greater levels of abstinence from drinking. This suggests that self-efficacy can be seen as a strong predictor of positive treatment outcomes and that increased self-efficacy may be evident to the therapist during the process of treatment (Cohen, 1988). The strength of this relationship highlights the fact that therapists may be able to assess self-efficacy in order to identify individuals who may be at greater risk of not learning new skills and thus not benefiting from rehabilitation. Model C suggests that knowledge of the individual’s cognitive functioning may be beneficial for appropriately-tailored intervention (Bates et al. 2006). It also suggests that whilst cognitively impaired individuals showed less improvement in self-efficacy by the end of treatment, post-treatment alcohol use did not decrease in relation to high self-efficacy, as it did in unimpaired individuals.
In addition, Bates and colleagues (2006) found that high self-efficacy at treatment entry predicted better compliance, and better compliance predicted higher self-efficacy three months after the completion of treatment. Therefore, individuals who have low self-efficacy in terms of their ability to abstain from drug and alcohol use may be less inclined to comply with treatment tasks and activities, and subsequently less likely to achieve treatment goals. These relationships may be greatly affected by cognitive impairment at the beginning of treatment, as it reduces self-efficacy and treatment compliance, and thus indirectly affects treatment outcomes. Therefore, individuals with cognitive ability lower than the normal average need to engage in tasks and programs that promote and enrich self-efficacy prior to undertaking treatment, as they appear to process information fundamental to successful rehabilitation differently from individuals with high self-efficacy.

Irrespective of their level of cognitive functioning, individuals entering psychotherapeutic intervention are primarily expected to engage in the change process and complete tasks and activities to try to modify problem behaviours (Prochaska, DiClemente & Norcross, 1992). Previous research has found self-efficacy to be a consistent factor in treatment outcome, although little is known about how cognitive impairment interacts with self-efficacy (Bates et al. 2006; Morgenstern & Bates, 1999). Morgenstern and Bates (1999) assessed this interaction between impairment and mechanisms of change (self-efficacy) and found that neurocognitive impairments moderated the relationship of self-efficacy and commitment to abstin from alcohol and other drug use for a six-month period following addiction treatment (Morgenstern & Bates, 1999). Their findings demonstrated that self-efficacy was a strong predictor of drug and alcohol outcomes in individuals who do not have cognitive impairments, but only weak predictors in individuals with significant neurocognitive impairments at post intervention. Impaired individuals however did not have worse six-month alcohol and drug use treatment outcomes compared to others. These findings highlight that the process (i.e., CBT)
that individuals engage in to achieve treatment outcomes may be more beneficial for individuals with neurocognitive impairment than for those who are unimpaired.

Self-efficacy is related to an individual’s judgement of their capacity to adequately perform and complete tasks. In CBT, self-efficacy is a vital factor associated with treatment outcomes. There is a strong relationship between the successful achievement of tasks and an individual’s cognitive ability (Anderson, 1992; Bandura 1993). Speed of processing and memory consolidation are argued to be important cognitive processes underlying an individual’s ability to process, develop, and apply newly learned skills. As such, speed of processing and memory consolidation are important factors associated with treatment or program outcomes. These mechanisms allow individuals to process key information to understand, consolidate, and incorporate knowledge into their attitudes and behaviour. Take for example, a prisoner who is unable to comprehend what is being discussed during rehabilitation. If the program is completed at a pace that does not suit the individual’s needs, it will compromise their ability to learn, master, and continually apply the new skills into their life, thus according to the research mentioned above, adversely affecting their self-efficacy and compromising future task attempts.

**Aims of the Study**

This study will explore the relationship between self-reported self-efficacy, speed of processing, and memory consolidation in a sample of Western Australian prisoners with varying levels of cognitive functioning. Firstly, this study will explore whether after completing the Think First program prisoners report improvements in their impulsivity, attitude towards solving problems and solving problems associated with everyday living. These factors were chosen because they directly relate to, and measure Salazar and Centeno’s (2015) four principles of learning. These learning principles are known to influence an individual’s
motivation to successfully complete tasks, and according to Jan et al. (2015) and Schunk and Zimmerman (2007) greatly influence perceived self-efficacy, which in turn, affects the individual’s successful navigation of future challenges.

To this end, the first aim of this study is to explore whether self-reported motivation and self-efficacy in this sample improves after engaging in a Think First program, which is designed to change the way prisoners think and behave in a prosocial manner. Changes in self-efficacy after completion of the Think First program would support the notion that when individuals engage in CBT and practise cognitive skills such as problem solving, they are more likely to experience increased motivation and self-efficacy as a result, even if they have cognitive impairments (Allsop et al., 2000; Longabaugh et al., 2005; Martinez et al., 2010).

Therapists who administer the Think First program on behalf of Corrective Services Western Australia believe the program can help to improve the skills noted above after completion of the Think First program. It is hypothesised that post-program scores on measures used, which include a measure of social problem solving (SPSI-R), and measures of attitudes toward current life problems (CRIME-PICS II), impulsivity (BIS-II), Willingness-Confidence to change, Willingness-Importance to change, Readiness to change (Zimmerman, Olson & Bosworth, 2000), and the General Self-Efficacy Scale (Jerusalem & Schwarzer, 1992) will be significantly higher than pre-program scores, indicating improved performance in skills necessary for positive treatment outcomes.

The second aim of this study is to explore whether scores on the Symbol Digits Modalities Test (which measures speed of information processing) and the Rey Auditory Verbal Learning Test-Long Delay (which is a measure of memory consolidation) predict changes in self-reported self-efficacy (on the General Self-Efficacy Scale: Jerusalem & Schwarzer, 1992) after completion of the cognitive skills program. These two tests were
selected from amongst the psychometric tests used in Study 1 because they measure two processes considered fundamental to learning and applying new information crucial to rehabilitation.

It was hypothesized that after controlling for pre-test reported self-efficacy, scores on the Symbol Digits Modalities Test and Rey Auditory Verbal Delayed Test-Long Delay would predict post-program self-reported self-efficacy, such that higher scores on these two cognitive measures would predict higher scores in reported self-efficacy. It was anticipated that speed of information processing and memory functioning would predict reported self-efficacy post-program, following similar relationship paths to those for Model C in the Bates et al. (2006) study which found that greater neurocognitive impairment predicted lower self-efficacy. It is important to bear in mind that all measures of self-efficacy in this study are self-reported, based on prisoners’ own accounts of changes or achievements post-program.

Method

Research design

This quantitative study used a cross sectional pre-/post-test design that involved eight dependent variables (DVs) including Willingness to change-confidence, Willingness to change-importance, Able to change (self-efficacy scale), Readiness to change, Motor, Cognitive, Non-planning and Total impulsivity (Barratt Impulsivity Scales), General attitude towards offending (Crime-psychological Inventory of Criminal Thinking Scale II), Positive Problem Orientation Scale and Perception of social problem-solving ability (Social Problem Solving Inventory-Total). There were two independent variables (IVs): Symbol Digits Modalities Test and Rey’s Auditory Verbal Learning Test.
Participants

The sample selected for Study 2 was selected from the sample obtained in Study 1. Participants were included in Study 2 if they had completed the measures for the Think First Program at pre- and post-test. The Think First program consists of 30 sessions of approximately 2.5 hours, with a 10-15 minute break in the middle of the session. Depending on the site, public holidays or other unforeseen events, the program length varies. In general, however, the program is delivered in between three and four sessions per week over a period of seven to ten weeks. Prior to the commencement of the program, the prison officers approached the prisoners and asked them if they would like to volunteer to participate in the study. This process was identical to the one for Study 1 described in Chapter 2.

Recruitment took place at five Western Australian Prison sites, which consisted of two female prisons (one maximum security and one pre-release centre) and three male prisons (one maximum security and two prison farms). The recruitment process included prisoners who were scheduled to participate in the Think First program (McGuire, 2005). Intra-prison dependencies (that is, factors which could introduce variability between participants in one prison and a sample drawn from another prison) were not controlled for, due to the complex nature of the prison environment. The demanding nature of the cognitive measures associated with this study restricted the number of appropriate participants who could engage in the Think First program. The participant data was pooled and treated as one sample, since Western Australian prisons are considered similar across sites, with maximum security prisons housing similar prisoners to other maximum security prisons and minimum security prisons housing similar prisoners to other minimum security prisons. A homogenous sample of prisoners across prisons was thus assumed to exist, so that intra-prison dependencies were not considered a statistical concern.
Primary inclusion criteria included diagnosis of substance dependence (as determined by DSM-IV; American Psychiatric Association, 2000) at time of engaging in the Think First program. This was diagnosed by the researcher using DSM-IV criteria (American Psychiatric Association, 2000). It was not known if participants were abstinent from substance use prior to testing, as the researcher was not granted permission to access participants’ prison conduct records.

Exclusion criteria included elevated symptoms of depression or anxiety at the time of the study as measured by the Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995). The mean rating for participants’ self-reported depression, anxiety and stress (Lovibond & Lovibond, 1995) was in the mild range for anxiety, depression and stress scores. Raw scores were converted to standard scores to allow for uniform comparisons and to compare the sample with the normative population mean. To control for Type 1 error due to multiple comparisons, Holm-Bonferroni adjustments were made to the alpha levels. Scores remained in their raw scores.

Overall, the sub group used in Study 2 was demographically and cognitively congruent to the total sample from Study 1. From the original 115 participants, 54 participants were selected for Study 2. This sub-group comprised 26 males and 26 females, who ranged in age from 22 to 50 years ($M = 34.5$ years, $SD = 6.32$). Their level of education ranged between Year 7 and 12, with approximately half having completed Year 10 ($M = 9.6$, $SD = 1.23$).

Measures

This research was designed to explore whether prisoners reported improvements in treatment outcomes and self-efficacy from engaging in the Think First offender rehabilitation program. Measures used included the battery of tests designed for the Think First program, which includes a range of self-reported measures, of which only the Barratt Impulsivity Scale
(Barratt, 1994), Crime PICS II (Frude, Honess & Maguire 1994), Positive Problem Orientation and Social Problem-Solving Inventory (D’Zurilla & Maydeu-Olivares, 1995) were utilised. These self-report measures are designed to assist prisoners in improving interpersonal problem-solving skills, to reduce the likelihood of reoffending.

Other self-reported measures included a range of motivational measures including: Willingness-Confidence to change (Zimmerman, Olson & Bosworth, 2000, 2000), Willingness-Importance to change (Zimmerman, Olson & Bosworth, 2000, 2000), Readiness to change (Zimmerman, Olson & Bosworth, 2000, 2000), and the General Self-Efficacy Scale (Jerusalem & Schwarzer, 1992). These measures were chosen because motivation and self-efficacy are consistent measures of outcomes (Bandura, 1986; Schunk, 1995).

All assessment tools used in this study were self-report measures administered before and after the individuals completed the Think First program.

Motivation measures

**Willingness-to-change.** Willingness-to-change was measured by an adapted version of the Readiness-to-Change Ruler (Zimmerman, Olson & Bosworth, 2000). The Willingness-to-Change Ruler focuses on the importance a participant places on changing their behaviour and how much a change is wanted or desired. Participants were asked two questions: Question 1: ‘How important is it for you to change?’ and Question 2: ‘How confident are you that you could change if you decided to?’ (see Appendix J). Question 1 data represents the variable Willingness-to-change-Importance, and Question 2 data represents the variable Willingness-to-change-Confidence. Participants were instructed to circle a number on a scale from 1 to 10 for each question. Scores of 1–3 represent not-important/confident; scores of 4–7 represent uncertainty, and scores of 8-10 represent important/confident to change. Other similar studies
have also measured the importance and confidence of changing behaviour through use of the Readiness-to-Change Ruler (Sobell, Sobell & Leo, 1993; Sobell & Sobell, 1995, 1996). LaBrie, Quinlan, Schiffman and Earleywine (2004) found that Willingness-to-Change Rulers outperformed questionnaires in predicting behavioural intentions, suggesting that the Change Ruler had at least comparable concurrent criterion validity ($r=.77$).

**Able-to-change.** According to Miller and Rollnick’s theory of motivation, the concept ‘able to change’ implies a belief in an individual’s ability to implement the behaviours needed to successfully achieve a desired effect (Kadden & Litt, 2011). This is consistent with the psychological construct of self-efficacy (see Chapter 1). Therefore, to measure individuals’ belief about their own capacity to succeed, the General Self-Efficacy Scale (Jerusalem & Schwarzer, 1992) was administered (see Appendix K). This is a ten-item self-report questionnaire that measures an individual’s general perceived self-efficacy and self-belief. Self-efficacy is an important determinant of behavioural change (Bandura, 1977). Participants were directed to answer each statement and circle the most accurate response on a four-point Likert scale (1: not true at all to 4: exactly true). A typical statement was, ‘I can always manage to solve difficult problems if I try hard enough’. All ten items provide a total final composite score with a range from 10 to 40. Research has shown the internal consistency of the scale to be acceptable ($\alpha=.76$ to $\alpha=.90$; Leganger, Kraft & Roysamb, 2000).

**Readiness-to-Change.** Readiness-to-change was measured by the Readiness-to-Change Ruler (Zimmerman, Olson & Bosworth, 2000). This measure was used as a quick assessment for determining clients’ readiness-to-change behaviour. Participants were asked ‘How ready are you to make changes in your life right now?’ and were required to circle a number on a Likert scale of 1 (not ready) to 10 (ready) (see Appendix L). Scores of 1–3 represent non-readiness to change, scores of 4–7 represent uncertainty and scores of 8-10 represent readiness.
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to change. The number was recorded prior to the participants’ engagement in the Think First program and then again at the completion of the program. LaBrie et al. (2004) found that readiness-to-change rulers outperformed questionnaires in predicting behavioural intentions, suggesting that the ruler had at least comparable concurrent criterion validity ($r=.77$).

*Think First Measures*

**Barratt Impulsivity Scale (Barratt, 1994).** The 30-item Barratt Impulsivity Scale II is a self-report measure which takes approximately 15 minutes to complete. It assesses tendency to respond impulsively in certain contexts and assesses impulsivity as a trait independent of anxiety. It contains three subscales: (1) Motor impulsivity: acting without thinking; (2) Cognitive impulsivity: making quick cognitive decisions; and (3) Non-planning impulsivity: lack of concern for the future. This measure is often used as a total scaled score for impulsivity. Participants responded on a four-point Likert scale ranging from a score of 1: ‘*I rarely/never do that*’; to a score of 4: ‘*I almost always/always do that*’; a score of 1 indicates least impulsive choice, whilst a score of 4 indicates most impulsive choice. Total scores can range from 30 (minimum score) to 120 (maximum score).

Higher total scores are indicative of greater impulsivity. A high motor impulsivity score denotes someone who acts without thinking; a high cognitive impulsivity score denotes someone who makes quick cognitive decisions; and a high non-planning impulsivity score denotes someone who is not concerned about and does not plan for the future. Internal reliability estimates across diverse samples range from $\alpha=.79$ to $\alpha=.83$. The internal consistency alpha coefficient for the present sample was $\alpha=.77$ (Kaslow et al., 2004).

**Crime-psychological Inventory of Criminal Thinking Scale II (Parts I & II) (Frude et al., 1994).** The Crime-psychological Inventory of Criminal Thinking Scale is a measure of
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respondents’ attitudes towards crime, victims and their current life problems. It consists of 20 items on which participants are asked to rate each item from one (strongly agree) to five (strongly disagree). The scale provides five scores: General attitude towards offending; Anticipation of re-offending; Victim hurt denial; Evaluation of crime as worthwhile; and Perception of current life problems. Items include statements such as ‘I will allow nothing to get in the way of me getting what I want’. General attitude towards offending (scale G; r= 0.76) was the only scale utilised from the administration test.

Frude, Honess and Maguire (1998) aggregated each scale to obtain the overall score for each attitude domain and the inventory on perceived problem areas. Higher scores on each of the subscales and a higher overall score on the measure indicates attitudes that predispose the participant toward crime. General offending behaviour programs aim to assist offenders in developing prosocial goals, values, and lifestyles, so that scores on this scale would be expected to decrease over the course of treatment. The Crime-psychological Inventory of Criminal Thinking Scale II has been reported to be a valid and reliable measure in recent studies, with moderate to high internal consistency (ranging from $\alpha=0.55$ to $\alpha=0.83$; Frude et al., 2008; Healy, 2010; Wood, Kade & Sidhu, 2009). Similarly, the Crime-psychological Inventory of Criminal Thinking Scale II was found to be high in internal consistency (Cronbach’s $\alpha=0.79$).

Social Problem Solving Inventory (Revised) (D’Zurilla & Maydeu-Olivares, 1995).
The Social Problem-Solving Inventory (Revised) (short form) (D’Zurilla & Nezu, 1990) is a 25-item, self-report instrument that evaluates characteristics of social problem solving and the participant’s attitudes towards solving problems associated with everyday living. Participants rate each item on a five-point Likert scale from zero (not at all true) to four (extremely true) to indicate how much the statement applies to them. Items are worded generally, for example: ‘I wait to see if a problem will resolve itself first, before trying to solve it myself’. The items are
organised into a total Social Problem Solving score. The SPSI-R has high internal consistency reliability for both the total score and the five scale scores. Within this total scale, the positive problem orientation scale measures constructive, problem solving cognitive set. Each subscale score ranges from 0 to 20, and the total scores for the Social Problem Solving Inventory (Revised) range from 0 to 100. Individuals with higher scores on this scale are more likely to (a) appraise a problem as a challenge; (b) believe that problems are solvable; (c) believe in their ability to solve problems successfully; (d) believe that successful problem solving takes effort; and (e) commit to solving problems rather than avoiding them (Maydeu-Olivares & D’Zurilla, 1996, p. 31). Cronbach’s alpha ranged from $\alpha=.69$ to $\alpha=.95$ for scales, $\alpha=.95$ for the total score and good test/retest reliability over 3 weeks from $r=.69$ to $r=.91$ for scale scores, with $r$ ranges from $r=.89$ to $r=.93$ for the total score in different samples (D’Zurilla & Nezu, 1990). High scores denote good problem-solving ability, while low scores denote poor problem-solving ability, suggesting a deficiency that might contribute to maladjustment or reduced functioning.

Procedure

Procuring a matched control sample was outside the scope of the current study, as finding sufficient numbers of prisoners without a history of substance use who engaged in the Think First program was not practical for two major reasons. First, both current and past substance use and substance dependence is high amongst prisoners (ABS, 2016; Davidson et al., 2015) making it difficult to procure a matched control sample of prisoners with no substance use history. Given the time frame of this project, it would have been difficult to find a large enough sample of prisoners who had never used or been dependent on a substance.

Prior to entering the prison to collect data, information and permission letters were sent to the Superintendents and Superintendent of Security (Appendix A). On entry into the Think First program, the facilitators interviewed each individual to determine suitability to engage in
the program and to gather information prior to them engaging in the program. During this interview, the facilitators explained the study to the individual, provided them with an information sheet (Appendix B) and obtained informed consent (Appendix C). Prisoners who volunteered to participate then attended a group session with the researcher. At this group session, the purpose of the research was explained in detail and consent forms were signed.

Prior to commencement of the Think First program, the facilitators (trained prison officers) organised a group day with all individuals enrolled in the program to complete the psychometric questionnaires relevant to the program (program outcome measures). The Think First measures were administered in the group room by program facilitators over a two-hour period. The completed self-report measures were sealed and delivered to a secure location in the Research and Evaluation Unit of the Department of Corrective Services Western Australia.

The researcher administered motivation measures over a 45-minute period with no break, on the first and last days of the Think First program. The researcher read out the instructions and the individuals completed the self-report measures on their own within a group format. All outcome measures, including the motivation measures, were administered approximately three to four months post-program. The measures of Symbol Digits Modalities Test (SDMT) and Rey Auditory Verbal Learning Test – Long Delay (RAVLT-LD) were administered prior to and at the completion of the Think First Program. For the purposes of the results, pre-group indicates that testing was conducted before the program commenced, while post-group indicates that testing was conducted after the program was completed, three to four months later. Think First program measures were administered to a group consisting of between six to ten individuals at one time. Participants sat separately and completed their tests. If participants had any questions, they raised their hand and the researcher attended to them.
quietly, so as not to disturb others. Individuals were instructed to remain quiet whilst the others completed their tests. Some sat quietly while others left the room.

**Results**

Scores were statistically compared before and after completion of the Think First program for each of the eight dependent variables, including Willingness to change-confidence, Willingness to change-importance, Ability to change (self-efficacy scale), Readiness to change, the Barratt Impulsivity Scale, Crime-psychological Inventory of Criminal Thinking Scale, Social Problem-Solving Inventory and positive problem orientation. The relationships between cognitive test scores and these eight dependent variables were also examined.

**Test Scores of the Sample in Study 2**

See Table 5 for descriptive statistics for the performances of the subsample for Study 2 on the cognitive tests administered in Study 1. The z score means and standard deviations across the majority of cognitive domains highlight the differences in ability between the prison population in this sample and the general population. A series of one sample $t$ tests were performed, and showed a statistically significant difference between the prison sample in Study 2 compared to the normative sample for the measure speed of processing ($M=-1.92, SD=1.26$), whilst scores on the memory consolidation measure showed no statistical difference between the two samples ($M=-.35, SD=1.10$). This indicated that on average the prison sample performed significantly worse than the normative population.

When compared to the larger sample in Study 1, there was a difference in memory consolidation performance between the full prison sample and the subsample of prisoners used in Study 2; with the larger sample showing a significant difference for the sample used in Study 2. This may indicate that the subsample drawn for Study 2 may have more intact cognitive ability in this domain than the larger sample. Overall, the prison sample in Study 2 performed
lower than the normative mean on important factors shown to be significantly related to an individual’s perceived ability to accomplish a task (e.g., complete psychotherapeutic rehabilitation), such as self-efficacy, speed of processing, and memory consolidation (Kadden & Litt, 2011; Valentijn et al., 2006). These domains are the focus of this study, as they are significant processes that underlie learning difficulties.
### Power Analysis

Two power analyses were conducted using G*Power 3.1.6 (Faul, Erdfelder, Buchner & Lang, 2009) to understand the sample size required. For Hypothesis 1 which utilised a MANOVA to achieve satisfactory statistical power (0.8) at a medium effect size ($f^2 = 0.25$) with the alpha level set at .05, 36 participants were needed (see Appendix M for calculation).

Hypothesis 2 (which tested the predictive utility of two cognitive measures on post-test self-efficacy, whilst controlling for pre-test self-efficacy via a hierarchical multiple regression) needed a total sample size of 43 to achieve adequate power (0.8) at a medium effect size ($= 0.15$) with the alpha set at .05 (see Appendix M for calculation). This study was considered to have an adequate sample size.

---

#### Table 5: Study 2 prison sample (N = 52) standardized ($z$) mean score differences from normative sample mean (=0) for each psychometric measure

<table>
<thead>
<tr>
<th>Measure</th>
<th>Domain</th>
<th>Mean</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFWD</td>
<td>Attention</td>
<td>-.84</td>
<td>(0.87)</td>
</tr>
<tr>
<td>DBWD</td>
<td>Working Memory</td>
<td>-1.13</td>
<td>(0.73)</td>
</tr>
<tr>
<td>DT</td>
<td>Working Memory</td>
<td>-.28</td>
<td>(0.82)</td>
</tr>
<tr>
<td>LNS</td>
<td>Working Memory</td>
<td>-.40</td>
<td>(0.87)</td>
</tr>
<tr>
<td>RAV SD</td>
<td>Short Term Memory</td>
<td>-.48</td>
<td>(1.22)</td>
</tr>
<tr>
<td>RAV LD</td>
<td>Memory Consolidation</td>
<td>-.35</td>
<td>(1.10)</td>
</tr>
<tr>
<td>SDMT</td>
<td>Processing Speed</td>
<td>-1.92*</td>
<td>(1.26)</td>
</tr>
<tr>
<td>RAV A</td>
<td>Verbal Learning</td>
<td>-.86</td>
<td>(1.05)</td>
</tr>
<tr>
<td>RAV B</td>
<td>Immediate Interference Susceptibility</td>
<td>-.64</td>
<td>(0.72)</td>
</tr>
<tr>
<td>VFC1</td>
<td>Letter Fluency Performance</td>
<td>.08</td>
<td>(0.94)</td>
</tr>
<tr>
<td>VFC2</td>
<td>Semantic knowledge</td>
<td>.48</td>
<td>(1.04)</td>
</tr>
<tr>
<td>VFC3 (TC)</td>
<td>Cognitive Shifting</td>
<td>-.02</td>
<td>(0.93)</td>
</tr>
<tr>
<td>S/F+E</td>
<td>Cognitive Flexibility</td>
<td>.13</td>
<td>(0.85)</td>
</tr>
<tr>
<td>S/N+R</td>
<td>Cognitive Flexibility</td>
<td>-.25</td>
<td>(0.88)</td>
</tr>
<tr>
<td>CS vs. CF</td>
<td>Retrieval of Knowledge &amp; Cognitive Flexibility</td>
<td>-.47</td>
<td>(1.25)</td>
</tr>
<tr>
<td>CWIT 4</td>
<td>Inhibition/Switching</td>
<td>-.42</td>
<td>(0.87)</td>
</tr>
<tr>
<td>20 Qs IAS</td>
<td>Abstract Reasoning &amp; Problem Solving</td>
<td>-.27</td>
<td>(0.79)</td>
</tr>
<tr>
<td>20 Qs WAS</td>
<td>Incorporation of Feedback</td>
<td>.41</td>
<td>(0.87)</td>
</tr>
</tbody>
</table>

*Note. DBWD = Digits Backward. DT=Digits Total. LNS = Letter Number Sequencing. SDMT = Single Digit Modalities Test. RAV A = RAVLT A. RAV B = RAVLT B. RAV SD = RAVLT Short Delay. RAV LD = RAVLT Long Delay. VFC1 = Verbal Fluency Condition 1. VFC2 = Verbal Fluency Condition 2. VFC3 (TC) = Verbal Fluency Condition 3 (Total Correct). S/F+E = Design Fluency Switching vs. Filled + Empty Dots. S/N+R = Design Fluency Switching vs. naming + reading. CS vs. CF = Category Switching vs. Category Fluency. CWIT C4 = Color-Word Interference Test Condition 4. 20 Qs IAS = Twenty Questions Initial Abstraction Score. 20 Qs WAS = Twenty Questions Weighted Achievement Score.*
Hypothesis Testing

Hypothesis 1

To assess the first hypothesis, a multivariate analysis of variance (MANOVA) was conducted to ascertain whether there were differences in pre- and post-completion scores on the Think First program for the group of 52 participants, on each of the following dependent variables: (1) Barratt Impulsivity Scales (Motor, Cognitive, Non-planning and Total impulsivity); (2) Crime-psychological Inventory of Criminal Thinking Scale II (general attitude towards offending); (3) Positive Problem Orientation Scale; (4) Social Problem Solving Inventory-Total (perception of social problem-solving ability); (5) Readiness to change scale (readiness to engage in change); (6) Willingness-Confidence (willingness/confidence in change); (7) Willingness-Importance (importance in change); and (8) Able to change (measured by the General Self-efficacy Scale (judgement of one’s own ability to complete tasks).

Prior to the analysis, assumption testing was performed to ascertain the normality and adequacy of the data set. Normality tests, homogeneity of variance and residuals, and visual inspection of the data indicated that it was acceptable for data analysis (see Appendix N for Assumption Testing). The MANOVA using Pillai’s trace indicated there was a significant main effect for therapy on the eight dependent variables collectively which are important for an individual’s ability to engage in therapy: \( V = .61, F (12, 40) = 5.23, p < .001 \). That is, there was a significant difference pre- and post-program on five of the eight variables (Impulsivity, Attitude of Offending, Positive Problem Orientation Scale, Social Problem Solving Inventory-Total and General Self-efficacy).

To understand what outcome variables contributed to significant differences between pre- and post-test scores, separate univariate ANOVAs were conducted (see Table 6). The
results indicated that pre- and post-test scores did not differ significantly for ratings on Willingness-Importance: $F(1, 51) = .39, p = .537$; Willingness-Confidence: $F(1, 51) = .56, p = .459$; Readiness: $F(1, 51) = 2.66, p = .109$ or Non-Planning Impulsivity scales: $F(1, 51) = .86, p = .358$.

A significant effect after the completion of the Think First program was found for seven of the eight dependent variables. Three of the four domains of Impulsivity were found to have a large effect size when pre- and post-program completion scores were compared (Cohen, 1988). These were Motor Impulsivity: $F(1, 51) = 9.157, p = .004$, partial $\eta^2 = .152$; Cognitive Impulsivity: $F(1, 51) = 10.187, p = .02, \eta^2 = .166$; Total Impulsivity: $F(1, 51) = 6.377; p = .015, \eta^2 = .111$. Attitude of Offending: $F(1, 51) = 19.144, p = .001, \eta^2 = .273$; and General Self-Efficacy Scale: $F(1, 51) = 10.728, p = .002, \eta^2 = .174$, also indicating a modest effect (Cohen, 1988). By contrast, the Positive Problem Orientation Scale, $F(1, 51) = 4.767, p = .001, \eta^2 = .308$ had a moderate effect while Social Problem Solving Inventory-Total score indicated a strong effect on the outcome with $F(1, 51) = 50.022, p = .001, \eta^2 .495$.

These outcomes suggest that after participating in the Think First program, the group reported reduced impulsivity, higher levels of self-efficacy and greater confidence in their ability to solve problems. Areas in which the average prisoner reported improvement after engaging in the Think First program included their attitude towards offending, their perception of the number of problems in their life (Positive Problem Orientation Scale), social problem-solving ability (Social Problem Solving Inventory-Total Score), perceived self-efficacy (General Self-Efficacy Scale), and ability to make cognitive decisions without being impulsive (Cognitive Impulsivity). A slight improvement was reported in their ability to stop and think before acting (Motor Impulsivity). The largest significant effect size between mean scores at pre- ($M= 101.8, SD=16.8$) to post-program ($M= 114.0, SD=14.8$) was on the Social Problem
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Solving Inventory-Total Score $d = 0.990$, which is considered a large effect (Cohen, 1988). The smallest significant effect size between post- and pre-program mean scores was within the Cognitive Impulsivity measure (Pre: $M = 17.93$, $SD = 3.9$; Post: $M = 16.0$, $SD = 3.64$), $d = 0.455$, which is considered a medium effect (Cohen, 1988).

No statistical differences were found in four of the eight tests that are important for treatment outcomes and success. After participating in the Think First program, participants did not record improvements in the non-planning impulsivity, willingness-importance, willingness-confidence and readiness measures. This suggests that the skills developed during the program did not adequately shift the prisoners’ willingness and readiness to change their behaviour, or reduce their impulsivity, which may result in increased negative outcomes. It is possible the program itself was too short to successfully affect these traits, as these factors are more stable in nature and require prolonged treatment to facilitate change.

In summary, and in relation to Hypothesis 1, the multivariate analysis of variance found a significant pre/post difference in five of the eight self-reported dependent variables (i.e. impulsivity, attitudes of offending, positive problem orientation, social problem-solving inventory-total score and general self-efficacy scale of the Think First program). Univariate analysis of variance indicated significant differences in three of the four domains of impulsivity (motor, cognitive and total impulsivity), attitude of offending, and general self-efficacy. Positive problem orientation had a moderate effect ($\eta^2 = .308$) and social problem-solving inventory-total score had a strong effect on post self-efficacy ($\eta^2 = .495$).
Table 6: Pre- and post- measure scores at completion of Think First program

<table>
<thead>
<tr>
<th>Test</th>
<th>Mean (SD)</th>
<th>F value</th>
<th>p value&lt;sup&gt;1&lt;/sup&gt;</th>
<th>ηp&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impulsivity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre BISII Motor</td>
<td>24.235 (4.911)</td>
<td>9.157</td>
<td>.004**</td>
<td>.152</td>
</tr>
<tr>
<td>Post BISII Motor</td>
<td>22.236 (3.994)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre BISII Cognitive</td>
<td>17.938 (3.999)</td>
<td>10.187</td>
<td>.002**</td>
<td>.166</td>
</tr>
<tr>
<td>Post BISII Cognitive</td>
<td>17.031 (3.999)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre BISII Non-planning</td>
<td>25.977 (5.986)</td>
<td>.861</td>
<td>.358</td>
<td>.17</td>
</tr>
<tr>
<td>Post BISII Non-planning</td>
<td>24.752 (9.935)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre BISII Total</td>
<td>66.817 (12.356)</td>
<td>6.377</td>
<td>0.015**</td>
<td>.111</td>
</tr>
<tr>
<td>Post BISII Total</td>
<td>31.686 (14.426)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attitude to Offending (CRIME PICS II)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>36.115 (9.725)</td>
<td>19.144</td>
<td>&lt;.001***</td>
<td>.273</td>
</tr>
<tr>
<td>Post</td>
<td>31.231 (8.048)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PPO</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>28.596 (7.882)</td>
<td>4.767</td>
<td>&lt;.001***</td>
<td>.308</td>
</tr>
<tr>
<td>Post</td>
<td>24.173 (7.084)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPSI-R</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>101.807 (16.849)</td>
<td>50.022</td>
<td>&lt;.001***</td>
<td>.495</td>
</tr>
<tr>
<td>Post</td>
<td>114.058 (14.859)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Readiness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>9.236 (1.187)</td>
<td>2.658</td>
<td>.109</td>
<td>.05</td>
</tr>
<tr>
<td>Post</td>
<td>9.469 (.956)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Willingness-Confidence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>9.902 (6.525)</td>
<td>.556</td>
<td>.459</td>
<td>.01</td>
</tr>
<tr>
<td>Post</td>
<td>9.240 (.946)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Willingness-Importance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>9.417 (.979)</td>
<td>.386</td>
<td>.537</td>
<td>.08</td>
</tr>
<tr>
<td>Post</td>
<td>9.379 (.999)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GSES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.042 (.415)</td>
<td>10.728</td>
<td>.002**</td>
<td>.174</td>
</tr>
<tr>
<td>Post</td>
<td>3.258 (.409)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Hypothesis 2

A hierarchical multiple regression was performed on the second hypothesis of the current study, that is whether cognitive functioning predicted the prisoners’ self-reported ability to complete tasks successfully. The scores for the Symbol Digits Modalities Test and Rey Auditory Verbal Learning Test-Long Delay had been collected pre-test, and were entered as predictors into the regression model, with post-test self-reported self-efficacy scores entered as the criterion variable and pre-test self-reported self-efficacy scores entered as a covariate.

Before interpreting the results of the multiple regression analysis, a number of assumptions were tested, and checks were performed. First, stem and left plot and boxplots indicated that each variable in the regression was normally distributed and free from univariate outliers. Second, an inspection of the normality probability plot of standardised residuals and the scatterplot of standardised residuals against standardised predicted values indicated that the assumption of normality, linearity and homoscedasticity of residuals were met. Third, Mahalanobis’s distance did not exceed the critical $\chi^2$ for $df = 3$ (at $\alpha = .001$) of 16.266 for any cases in the data file, indicating that multivariate outliers were not of concern. Finally, relatively high tolerances for the predictors in the final regression model indicated that multicollinearity would not interfere with our ability to interpret the outcome of the multiple regression analysis.

On Step 1 of the hierarchical multiple regression analysis, pre-test self-efficacy scores accounted for a significant 11.4% of the variability in Think First program outcome: $R^2 = .114$, $F (1, 50) = 6.43, p = .014$. On Step 2, pre-test scores on the Rey Auditory Verbal Learning-Long Delay and Single Digits Modalities Test were added to the regression equation. This accounted for a non-significant additional 9.8% of variance in program outcome: $\Delta R^2 = .098$, $F (3, 48) = 1.64, p = .194$. 


\( \Delta F(2, 48) = 2.9, p = .061 \). In combination, the three variables explained 21.2% of the variance in program outcome (post-test self-efficacy): \( R^2 = .212, \) adjusted \( R^2 = .162, F(3, 48) = 4.29, p = .009 \). Unstandardized \( (B) \) and squared semi-partial (or part) correlations \( (sr^2) \) for each predictor on each step of the hierarchical multiple regression analysis are reported in Table 3.

RAVLT scores explained a non-significant amount of variance for post-test self-efficacy, indicating performance on this measure did not predict reported self-efficacy. As can be seen in Table 7, the only significant predictor of program outcome in the final regression model were scores on the Symbol Digits Modalities Test \( (sr^2 = .096) \). In isolation, SDMT explained a significant amount of variance in reported self-efficacy (i.e. 9.6%).

Table 7: Unstandardized \( (B) \) and standardised \( (\beta) \) regression coefficients, and squared semi-partial (or part) correlations \( (sr^2) \) for each predictor on each step of the hierarchical multiple regression predicting post-test self-efficacy in program outcome \( (n=52) \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>( B ) [95% CI]</th>
<th>( \beta )</th>
<th>( sr^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Test Self-efficacy</td>
<td>0.333 [0.69 - 0.59] *</td>
<td>.338</td>
<td>.114</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Test Self-efficacy</td>
<td>0.260 [0.002 - 0.523]</td>
<td>.264</td>
<td>.065</td>
</tr>
<tr>
<td>RAVLT Long Delay</td>
<td>-0.045 [-0.145 - 0.055]</td>
<td>-.121</td>
<td>-.013</td>
</tr>
<tr>
<td>SDMT</td>
<td>0.108 [0.018 - 0.197] *</td>
<td>.332</td>
<td>.096</td>
</tr>
</tbody>
</table>

Note. CI = Confidence Interval. RAVLT Long Delay = Rey’s Auditory-Verbal Learning Test - Long Delay. SDMT = Symbol Digits Modalities Test. *p < .05 ** p < .01 *** p < .001

Hence, in relation to Hypothesis 2, these results indicate that speed of processing information, as measured by the Symbol Digits Modalities Test in isolation, explained 9.8% of variance in program self-reported self-efficacy at post-test. Higher scores on the Symbol Digits Modalities Test were significantly correlated with higher difference scores on the self-reported self-efficacy post-test relative to the pre-test scores. The Symbol Digits Modalities Test scores explained a significant amount of variance for post-test self-efficacy, with higher scores on the
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SDMT predicting higher reported self-efficacy. The results indicated that the RAVLT did not predict performance on this measure.

Discussion

The current study explored how a sample of Western Australian prisoners with varying levels of cognitive function self-report their self-efficacy, motivation, and willingness to change after completing the Think First program on several measures used to assess rehabilitation outcomes in the prison system. The effect of both speed of information processing and memory consolidation on reported self-efficacy was also explored, an important treatment outcome associated with reduced recidivism.

The first aim of this study explored whether a sample of Western Australian prisoners’ self-reported self-efficacy would increase after engaging in the Think First cognitive skills program. The first part of the hypothesis investigated whether there were differences in pre- and post-completion scores across the Think First program’s treatment measures and the measure of motivation. This hypothesis was partially supported. Participants in the Think First program reported an improvement in some of the measures. A large meaningful difference between pre- and post-program scores was found in the Social Problem Solving Inventory-Total score measure, with a .495 SD difference between the mean scores for the Social Problem Solving Inventory pre-test, relative to the mean post-test Social Problem Solving scores, indicating improvement at post-intervention. Cohen (1988) finds this to be a large and meaningful difference between pre- and post-program which shows a statistically significant change has occurred in the domain of social problem solving after completion of the Think First program. This showed that participation in the Think First program meaningfully improved the prison sample’s social problem solving skills, which are fundamental to successful treatment outcomes.
The smallest significant effect size found was in the cognitive impulsivity measure, yet it was still significant, and shows that the ability to control one’s impulsivity can affect prisoner rehabilitation. Impulsive individuals will more than likely struggle to think and plan appropriate responses to situations, and this may lead to unpredictable behaviour. This can be directly related to prisoners’ executive functioning, since individuals with poor executive functioning can have difficulty effectively modulating their cognitive resources and responding in a socially appropriate way to situations.

Other areas in which there was a reported change post-program included scores on the Positive Problem Orientation scale, the Crime-psychological Inventory of Criminal Thinking scale and the General Self-efficacy scale. There was a moderate effect size (.308) from pre-to post-program for the positive problem orientation measure, indicating improvement in this area after completion of the Think First program. This may suggest that the program may have assisted participants to think and feel differently about problems and enhanced their ability to solve them. The improved difference between the pre- and post-test scores on the Crime-psychological Inventory of Criminal Thinking Scale-Total score was also of a moderate effect size (.273), indicating that prisoners reported that the program overall was sensitive to the cognitive patterns specific to criminal conduct. Being able to think and feel differently about solving problems, and to learn ways to challenge problematic thinking may reduce further criminal behaviour. Thus, the program may be seen as a method of behaviour modification which helps prisoners with a history of substance dependence to learn strategies to avoid high risk situations, as well as facilitating harm minimisation and abstinence by showing prisoners how to manage urges and cravings. However, the reader must be mindful that measures used in this study were self-reported.
Overall, these results suggest that by engaging in programs utilizing the essential cognitive tools of CBT, prisoners can be taught to minimize actions that may have led them to offend in the first place. By enhancing their self-efficacy, motivation, and applied problem solving ability, targeted programs may increase their judgement of self, others and behaviours, which could then assist in the reduction of negative behaviour and increase their quality of life. Studies have shown that prisoners who participate in offender rehabilitation programs like Think First are likely to show a reduction in negative behaviour (e.g., recidivism) compared to those who are not treated (Khodayari Fard et al., 2010; Lipsey et al., 2007; Wilmot & Delone, 2010). Andrews and Bonta (2010) further argue that greater reductions in recidivism are found when prisoners engage in programs that adhere to the Risk-Need-Responsivity model, which takes into consideration responsivity factors such as motivation and cognitive functioning.

Self-efficacy, an important predictor of treatment success, was assessed pre- and post-completion of the Think First Program, via self-report. The participants’ mean scores on the general self-efficacy scale at pre-test ($M = 3.042$) were statistically lower than scores at post-test ($M = 3.258$), indicating higher self-reported self-efficacy. This suggests that after the Think First program, participants reported greater belief in their likelihood of completing and achieving tasks, solving a problem or confronting a challenging situation (D’Zurilla & Nezu, 1990). Previous research has found similar results, reporting increases in self-efficacy scores post-program, particularly in cognitive skills training, suggesting that prisoners’ self-efficacy is higher post-program compared to pre-program. Other research, specifically, Lozano and Stephens (2010), considered 126 heavy-drinking college students who received a single cognitive-behavioural assessment/intervention session and completed measures of goal commitment, self-efficacy for goal achievement, and alcohol use. The study found that the more goals were set and achieved though CBT, the higher the level of post-treatment self-efficacy. Similarly, Ilgen, McKellar and Moos (2007) found skills building such as coping
strategy activities resulted in higher post-treatment self-efficacy. In a study of female prisoners with a history of substance dependence conducted by Law and Guo (2015), findings showed significant differences between pre- and post-test scores for self-efficacy, with high post-test scores noted for decision-making, action-planning, coping and social skills. Therefore, evidence suggests that by teaching individuals coping skills such as problem-solving, decision-making and social skills, and allowing them to practice these skills during therapy, they are more likely to master the skills that generate change in self-efficacy from pre- to post-program (Allsop et al., 2000; Longabaugh et al., 2005; Martinez et al., 2010).

Contrary to the first hypothesis, there were no statistical differences between pre- and post-completion of the Think First program on the measures of: (1) willingness-importance to change, (2) willingness-confidence to change, (3) readiness to change, and (4) non-planning impulsivity scales. This could suggest that these areas of functioning are stable and take time to change, in which case the Think First program may have been too short to facilitate meaningful change. However, motivation may have also hit the ceiling at pre-testing (as suggested by the high pre-test motivation scores), so there was little room for change during the program, which would thus make these findings consistent with research in the literature.

Prisoners’ processes of thinking, planning and ability to implement a plan to tackle a challenging situation may need more than a program of the length of the Think First program to result in meaningful and lasting changes in skill areas important for successful rehabilitation. Non-planning impulsivity involves constructs of self-control and cognitive complexity (Stanford et al., 2009) which may be difficult to acquire in a population that has experienced significant cognitive harm in these areas. However, our sample showed on average reduced cognitive impulsivity ($M = -0.42$, $SD = 0.87$) as measured by the Colour Word Interference Test - 4) when compared to the normative mean. Burgoyne and Tyson (2013) found prisoners
tended to make the shifts in cognitive and motor impulsivity, Crime-psychological Inventory of Criminal Thinking Scale-Total score and social problem-solving inventory (including positive problem orientation) post-program, with effect sizes ranging between .12 and .15. The sample also reported a change in the total Social Problem Solving score, which increased significantly \(F(1, 122) = 11.35, p < .001\) after the completion of the program, with effect sizes ranging between .05 and .08, indicating that the sample had improved social problem solving ability. Regarding the Crime-psychological Inventory of Criminal Thinking Scale, Burgoyne and Tyson (2013) measured each individual score and not the total score, with all subscale scores demonstrating significant change post-program. The effect sizes for these changes ranged between .11 and .28, which was consistent with the effect sizes reported in our study, indicating generalizability of the effectiveness of the program across different prison programs.

In other words, given time, the skills targeted by the Think First program can improve in prisoners. This finding is consistent with research by Bartholomew and Aurora (2001), whose findings suggest that a sample of incarcerated individuals demonstrated positive change in their general attitudes towards offending and anticipation of re-offending (subscales of Crime-psychological Inventory of Criminal Thinking Scale), victim empathy and perspective taking. They further reported that whilst there were positive changes, findings indicated that prisoners continued to have high impulsiveness scores and careless decision-making style scores post-program (as discussed in Chapter 3). However, Burgoyne and Tyson (2013) found the opposite in their study, and highlighted statistically significant positive shifts in prisoners post-program in non-planning impulsivity, with a small to medium effect from pre-to post (.15; Cohen, 1988). Differences in the findings may be due to several factors, including the level of cognitive functioning amongst the participants who participated in the program, implications of self-report measures (such as under-reporting, minimization of problems and faking positive responses), responsivity and therapeutic alliance. Burgoyne and Tyson (2013) did not measure
cognitive ability in their sample, and Study 1 suggests that the prison sample’s levels of cognitive impairment may have influenced their non-planning impulsivity. As they may not have the cognitive resources and capacity to improve impulsive behaviour, this may have further influenced skill development and retention in our study, and is perhaps a primary reason why predicted relationships reported in the literature were not found in this study. This may further support the argument that the essential cognitive skills that are targeted in the program are relatively stable and may need a greater amount of time to improve and change before they can influence treatment outcomes.

The scores on the motivational, willingness and readiness measures did not differ significantly post-program. This may point to a lack of reliability of the measures used in the current study, due to the fact participants may have presented favourably pre-program, thus limiting the opportunity to develop significantly higher motivational scores post-program. It is also possible that prisoners were at ceiling when completing the motivation measures at pre-test, possibly as a result of an experimenter effect. That is, the prisoners may have associated performance to their current situation when being tested and therefore tried harder, portraying themselves and their experience in a more positive light than they would normally. Once reaching post-program, it is possible that either the program was indeed effective in increasing motivation, but that they were already at ceiling pre-program, so that no improvement could be noticed statistically, even if the prisoners’ qualitative experience had changed significantly. Future research may need to employ other methods to gauge motivation levels to minimise this potential effect.

Cognitive skills learned in the Think First program are arguably required to grasp and apply newly learned information (Salazar & Centeno, 2015; Delors, 1996). Salazar and Centeno (2015) and Delors (1996) have indicated that there are four basic learning principles.
One of these principles is learning how to do. For an individual to benefit from the Think First program, they need to further develop existing basic cognitive skills such as language skills, memory, attention, capacity to focus and control impulses and motivate self.

The relationship between self-efficacy and cognitive functioning after completing the Think First program within this study may be best understood using the C model of Bates et al. (2006), in which cognitive impairment may act together with self-efficacy to influence the treatment outcome. Cognitive impairment may influence the relationship between treatment completion and self-efficacy. However, as comprehensive testing of this model was outside the scope of this study, further research needs to be undertaken to understand its true nature within this study cohort.

All psychometric measures and questionnaires used in the current study were self-reported and therefore positive shifts post-program were dependent on individuals’ self-reporting on the skills they had gained. This is problematic due to the fact that individuals generally over-report improvements and are prone to bias, and may artificially inflate improvements, in the hope of obtaining favourable outcomes in the future. It is also not known whether the independent variables (attitude towards offending, positive problem orientation, impulsivity and attitude towards problem solving) contributed to program outcomes or whether other variables precipitated this change, for example, prior learning experiences, content delivered or therapeutic alliance (Bates et al. 2006; Litt, Kadden & Stephens, 2005).

The second hypothesis in this study assessed whether scores on measures of speed of processing and memory consolidation predicted prisoners’ self-reported ability to complete tasks successfully. Hypothesis 2 was partially supported. That is, scores on the Symbol Digits Modalities Test uniquely and significantly predicted post-program self-reported self-efficacy. This finding suggests that speed of information processing predicted reported self-efficacy.
scores. This relationship was anticipated, given that speed of processing is associated with learning outcomes (Rypma & Prabhakaran, 2009). Speed of processing may affect the process by which a skill is adequately or inadequately learned. For example, it determines how fast an individual can take in and use information. With faster speed of processing, an individual will be more efficient in learning new tasks, encoding new information and drawing out information from memory to use in any given context. Slower speed of processing may impair and restrict cognitive resources responsible for accessing, storing and processing the information needed to perform tasks. By placing an individual in a positive learning environment that focuses on repetition, they are more likely to attend to the right information presented when completing tasks, which will help them to process information faster. If speed of processing performance is improved, an individual will be able to use their cognitive resources more effectively to master a task, which will in turn increase self-efficacy, since they will thus believe that they are more likely to achieve and complete tasks.

When considering cognitive functioning and self-efficacy, Salazar and Centeno (2015) and Delors (1996) highlight that cognitive functioning (for example, speed of processing) is one of the four basic learning principles that are required for an individual to learn new information and benefit from rehabilitation. The first principle, ‘learning how to know’ implies that the individual has adequate cognitive skills and resources to grasp, apply and reinforce what is learned. Take for example speed of processing, which enables an individual to apply what is learned at an adequate pace. Hypothetically, a prisoner may find themselves not able to take in what is being discussed during rehabilitation within the given amount of time, resulting in them not being able to put into practice the skills they have learned. Their self-efficacy will consequently be lower, due to their perceived inability to master and complete tasks at hand. Having adequate cognitive skills filters into the second, third and fourth learning principles, which ultimately allow an individual to function in their environment and to live a
prosocial lifestyle. Further to this, Bandura’s (1977) social cognitive theory indicates that an individual’s perceived self-efficacy can affect how they approach learning, and subsequently affect the outcome of rehabilitation. For instance, an individual who is slower at processing information may not complete a task within an expected deadline or to a clinician’s expectations, and this may then negatively affect their perceived self-ability and increase self-doubt, which in turns affects their ability to complete tasks. Their opinion of self, their perceived ability, and self-efficacy will then affect their actual ability to engage in effective rehabilitation (Adamson et al., 2009; Franckowiak & Glick, 2015; Kelly & Greene, 2014; Hall & Vance, 2010; Luszczynska, 2004; Randall et al., 2003).

The findings for Hypothesis 2 are consistent with the findings of Valentijn and colleagues (2006), in that one cognitive process was significantly related to program outcomes. It was found that speed of processing predicted self-reported self-efficacy, as measured by the General Self-Efficacy Scale (Jerusalem & Schwarzer, 1992) at post-completion of this cognitive skills program. Speed of processing plays a considerable role in learning (Catts et al., 2002) as it is a good predictor of how quickly and accurately an individual can perform a skill (Lichtenberger et al., 2012). This is crucial in rehabilitation, since applying what is learned during rehabilitation will reduce recidivism and improve an individual’s quality of life. Speed of processing along with other executive functions plays an indirect part in being able to set goals, respond to problems, and engage in activities, whilst self-efficacy requires the individual to believe in their ability to successfully achieve these tasks. Our results suggest that 70% of the sample that falls within 2 $SD$s below the normative mean has impaired speed of processing, and will therefore struggle to adequately perform the cognitive skills necessary for tasks related to successful rehabilitation.
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Future programs could consider employing differing program structures that give extra face-to-face time for individuals who are significantly cognitively impaired. This would give prisoners a better chance of mastering and developing the skills learned and make it easier for them to achieve positive treatment outcomes. As there is a great amount of variability in cognitive functioning within the prison system, whole group settings may not be appropriate and may have an unintended negative effect, with higher functioning prisoners disengaging because they do not feel challenged, and lower functioning prisoners failing to master skills. The more often an individual successfully completes a task, the greater their self-efficacy and self-confidence, and this in turn will increase their motivation to persist and display effort in completing more challenging tasks. However, bearing in mind Bates and colleagues’ (2006) models of treatment outcomes, it appears that the findings of Hypothesis 1 may reflect Model C, with higher cognitive functioning more likely to result in positive treatment experiences, which itself is related to reduced recidivism (Evans et al., 2009; Ogloff, 2002; Oliver et al., 2011).

Contrary to expectation, Rey’s Auditory Verbal Delayed Test-Long Delay as a measure of memory consolidation failed to predict changes in reported self-efficacy post-program. Changes in self-efficacy at post-test cannot therefore be attributed to performance on a task that does not indicate cognitive impairment. Yet several studies have found memory tasks to be a strong predictor of self-efficacy (McDougall, 2004; Payne et al., 2011). This may be due to the nature of the program or the cognitive profile of the sample, as mean z scores across a range of tests were either considered statistically similar or only marginally different from the normative mean. The prison sample performed statistically similar to the normative population on memory consolidation as they were (for this task) performing already at an acceptable level and therefore less likely to need improvement as the Think First program progressed, i.e. they did not need to focus on improving their memory consolidation as it already may have been a
strength, but rather focused on improving their speed of processing. Therefore, it is possible that the sample used in this study may be different from the participants obtained in previous research. However, it is noted that there was variability in performance on the RAVLT measure in this study’s sample, with some prisoners performing worse than, equal to, or greater than the normative population. As such, it is possible that the cognitive processes that lead to memory consolidation may not be directly affected or influenced by drug and alcohol abuse but may instead be ingrained and determined in earlier cognitive development prior to prisoner drug use. Although it is not possible to elucidate the exact cause or nature of these processes in this study, they could be the focus of future research.

Practical applications of the findings

This study found that cognitive functioning, specifically speed of processing and memory consolidation may determine the known differences in cognitive performance between the substance dependent prison and normative populations. These domains are fundamental to learning, mastering, and consolidating skills necessary for successful rehabilitation (Salazar & Centeno, 2015; Delors, 1996). Within this cohort, cognitive functioning is often compromised because of the prevalence of substance dependence. Cognitive functioning is important to therapeutic success, alongside motivation. One aspect of motivation - self-efficacy - has been seen to be equally important to cognitive functioning for therapeutic success. This study demonstrates that speed of processing is related to changes in reported self-efficacy and program completion. That is, improved speed of processing and memory consolidation appears to predict positive changes in treatment outcomes after the completion of the program. Successful program outcomes relate to reduced recidivism. An awareness of this fact will enable clinicians to be more responsive to prisoners’ needs, and will also provide clinicians
with the tools to assist prisoners to engage successively in more intensive psychotherapeutic programs to achieve ideal program outcomes.

Limitations and future directions

A major limitation of the study was that the measures for the Think First program and self-efficacy were self-reported. Studies using self-report methods have issues of validity, since participants, in this case prisoners, may under-report or minimise their problems (Ireland & Archer, 2008, as cited in Burgoyne & Tyson, 2013, p. 97-98). There are three main issues related to use of the self-report in this study. Firstly, prisoners may think the information provided could affect their sentencing and/or privileges gained either whilst incarcerated, or upon release. For this reason, future research could consider utilising other methodologies that are more objective in nature, to obtain more meaningful insights into performance post-program.

A second limitation was that the prison sample was not matched to a control group. Without a control group, it is difficult to disentangle therapy effect from the confounding effects of extraneous factors. Extraneous factors such as individuals’ history of engaging in previous intervention and factors outside of intervention (e.g., a positive phone call, seeing a visitor) may have contributed to favourable outcomes. Maturation and the general effect of testing also need to be considered. The measures used may not reflect the validity and reliability according to the instrumentation.

Apart from cognitive ability and other variables measured in this study, there are other variables which may also have affected self-efficacy measures. Therapeutic alliance and the method by which the program content was delivered may also have influenced the findings obtained. In the current study, different facilitators delivered the program at different sites, so
that therapeutic alliance could not be controlled for. Future research could seek to control for these variables, and standardise the method by which the program content is delivered, as previous research has indicated that this is also a predictor for self-efficacy (Ilgen et al., 2006).

**Summary**

In summary, the current results are particularly relevant to Western Australian prisoners who have varying degrees of cognitive impairment and engage in offender rehabilitation programs. Even though some prisoners do benefit from engaging in cognitive skills programs, cognitive functions such as speed of processing affect program outcomes. Speed of processing and other cognitive skills that are impaired in this cohort are relevant to learning. Some studies have identified cognitive skills programs as a foundation program for teaching prisoners cognitive skills required for engaging in subsequent criminogenic-specific programs. Future research however, might consider allocating participants to groups according to their level of cognitive function, in order to more meaningfully understand and compare across the dependent variables. Measures such as a neuropsychological test battery could be utilised alongside measures that are used to measure individual gains made pre- to post-program. This would provide stronger evidence to demonstrate the benefits of engaging in a program such as the cognitive skills program regardless of cognitive impairment.

Furthermore, understanding the relationship between substance use, cognitive functioning, self-efficacy and program outcomes is important for reducing recidivism, enhancing community safety and encouraging prisoners to live a prosocial lifestyle. At present, as seen in the literature, substance use is prevalent amongst the prison cohort, resulting in poorer treatment outcomes and higher post-program reoffending rates. This study of prisoners who may have compromised cognitive functioning found that they could improve skills in many areas, including self-efficacy, by engaging in offender rehabilitation programs like the
Think First program which consider principles of learning. The study also found that teaching cognitive skills improved individuals’ perceived ability to participate meaningfully in the program, and increased self-efficacy, a factor which is strongly associated with reduced recidivism.
Chapter 5: General Discussion

Introduction

The current research constitutes an investigation into the relationship between cognitive functioning and self-reported self-efficacy in Western Australia prisoners with a history of substance dependence after engaging in a cognitive skills program (Think First). Overall, the findings suggest that Western Australian prisoners have varying levels of cognitive impairment, with the average for the prison sample’s performance being significantly lower than in the general population. Specifically, 70% of prisoners processed information more slowly than the normative population. Speed of processing was found to significantly predict self-reported self-efficacy at the conclusion of the Think First program. This suggests that prisoners with compromised cognitive functioning may improve skills in self-efficacy by engaging in offender rehabilitation programs such as the Think First program.

This appears to be consistent with other research focussed on other populations. Individuals who have a history of substance dependence often have measurable cognitive impairments in domains that will compromise their ability to learn and remember information, process new information, have the capacity to shift attention, change the way they think, and adequately comprehend and master the content being presented in programs in general (Aharonovich et al., 2006; Forghani & Abadi, 2016; Passetti et al., 2008; Yücel & Lubman, 2007). In addition to this, cognitive impairments may interfere with other variables which affect treatment outcome such as self-efficacy. The studies in this dissertation have thus sought firstly to ascertain the cognitive profile of a sample of Western Australian prisoners, and then to explore the relationship between cognitive functioning and self-reported self-efficacy in prisoners before and after they engaged in the Think First cognitive skills program. A summary of the method and results for each study will first be provided below, followed by a discussion
of the treatment implications of the integrated findings in relation to the aims and hypotheses of the dissertation. Finally, the dissertation will end with a consideration of the wider implications of the current findings.

**Summary of Studies**

Study 1 explored cognitive functioning in a sample of Western Australian prisoners (n=115) with a history of substance dependence. Study 2 explored the relationship between cognitive functioning and self-reported self-efficacy in a sub-sample (n=52) of the prisoners in Study 1 after engaging in the Think First cognitive skills program. Study 1 employed tests for the cognitive and executive functioning domains which were chosen for their sensitivity in detecting neurocognitive deficits often found in chronic alcohol and drug dependent individuals (Rourke & Loberg, 1996). These measures were selected on the basis that they are suitable for measuring the cognitive and executive functioning of several domains that are crucial to learning, retaining and acquiring newly learnt information. Study 1 compared test performances in the sample of WA prisoners with the relative normative population on measures of cognitive and executive functioning; explored whether age of onset, frequency of use, chronicity of use and number of substances used predicted performance on these measures; and compared decision-making in WA prisoners with a history of substance dependence with a comparison sample in the Perth community.

Study 1 found that the prison sample had significantly lower functioning compared to the normative population in a number of cognitive and executive domains. After controlling for pre-morbid intellectual ability, between 4.3% and 70% of prisoners produced performances on psychometric cognitive measures that were within a range of clinical impairment, with 70% of the sample scoring at least 1.5 standard deviations below the normative mean on the measure of speed of processing. This was considered a large effect size, indicating a large difference
between the prison and normative samples (Cohen, 1988). This indicated that the prison sample had a slower processing speed when compared to the normative sample and that not all prisoners have the same level of cognitive impairment.

Age of initial onset and frequency of substance use were found to predict performance on several measures, demonstrating a significant relationship with cognitive and executive impairment. Age of initial onset was found to be the better predictor of the two, predicting impairments to the prisoners’ performance on a measure of memory and on retrieval of knowledge and cognitive flexibility. These findings indicated that the commencement of substance use early in life predicts impairments in aspects of memory and deficits in fluency when engaged in tasks that require switching between tasks (cognitive flexibility). *Frequency of substance use* was found to predict prisoners’ performance on executive measures for the cognitive shifting and flexibility domain. A significant negative relationship was found, indicating that prisoners who make greater use of substances are more likely to demonstrate impaired cognitive flexibility and cognitive shifting, than those who do not.

Furthermore, decision-making was found to be worse amongst the WA prison sample compared to a local Perth comparison group. This suggests that prisoners are more likely to take risks, have a greater tendency to engage in poor decision-making or be impulsive in their decision-making and be motivated by immediate gratification, resulting in long-term consequences.

Study 2 was a subgroup of Study 1 and employed several self-report measures drawn from the battery of tests designed for the Think First program (McGuire, 2005). These measures were employed to understand whether the Think First program improves skills associated with treatment outcomes once completed. Other self-reported measures utilised in Study 2 included motivational measures such as a measure of self-efficacy. Study 2 also
explored whether prisoners with varying levels of cognitive functioning after completing the Think First program reported improvements in impulsivity, attitudes towards solving problems, and solving problems associated with everyday living; whether prisoners self-reported increases in self-efficacy after engaging in the Think First program and whether measures of speed of processing (Symbol Digits Modalities Test) and memory consolidation (Rey’s Auditory Verbal Learning Test-Long Delay) predicted changes in self-reported self-efficacy (General Self-efficacy Scale: Jerusalem & Schwarzer, 1992) following completion of the Think First program.

Study 2 found a significant difference between pre-program and post-program results for several of the self-report measures administered. The largest effect size was on the Social Problem Solving Inventory-Total Score measure, indicating that participating in the Think First program significantly improved social problem solving skills, and highlighted prisoners’ self-reported positive changes in this cognitive domain. The smallest significant effect size found was in the cognitive impulsivity measure. The lowered ability to control impulsivity can affect rehabilitation, as individuals will more than likely struggle with the ability to think and plan appropriate responses to situations, thus leading to unpredictable behaviour. Furthermore, Study 2 demonstrated that the Symbol Digits Modalities Test (measure of speed of processing) predicted post-Think First self-reported self-efficacy. This finding suggests that greater improvement in speed of processing predicts greater scores in self-reported self-efficacy. This result may suggest that as prisoners improve their processing speed, that is, the improved ability to absorb and use information and perform tasks, they are more likely to believe in their own judgement that they have the capacity to complete tasks successfully.

Overall, the findings in Study 1 and Study 2 suggest that future rehabilitation needs to be responsive to individuals’ cognitive needs, rather than using a one size fits all approach. The
The cognitive profile of Western Australian prisoners varies from prisoner to prisoner, but the typical prisoner will struggle to learn and consolidate new information and maintain attention, and may also lack mental flexibility, and the majority of prisoners will be slower at processing information, all of which affects learning capacity. Alongside this, self-reported self-efficacy is important for the achievement of therapeutic goals. The research highlighted that not only was speed of processing found to be impaired in 70% of the WA prison sample, but that it is also related to changes in reported self-efficacy upon completion of the Think First program. Thus, in combination, Study 1 and Study 2 have highlighted that in order to ensure successful rehabilitation and a reduction in reoffending rates, clinicians need to have an awareness of individuals’ cognitive profiles before engaging with them on a therapeutic level.

Although therapy is generally conducted at a certain pace, slower processing speed may make the individual feel left behind as they struggle to complete the necessary tasks. This can result in lower self-efficacy, which in turn reduces the likelihood of individuals attempting more difficult tasks in the future, thus negatively affecting treatment outcomes. Salazar and Centeno (2015) and Delors (1996) indicate that there are four basic learning principles. One of these principles is learning how to do. This principle implies that for an individual to benefit from rehabilitation, they need to further develop existing basic cognitive skills such as language skills, memory, attention, capacity to focus and to control impulses, and self-motivation. Miller and Rollnick’s (1998) theory of motivation and Bandura’s (1977) social cognitive theory suggest that cognitive functioning is essential to therapeutic success, but judgement of one’s capacity to engage in therapy is equally important (Kelly & Greene, 2014).

Treatment Implications

The investigations outlined above provide more understanding of the nature of the relationship between cognitive functioning, self-efficacy and learning. Even without further
research, findings from the studies in this dissertation point to a potential gap between services currently provided to prisoners and the process that leads to effective offender rehabilitation. This gap is characterised by the lack of consideration of prisoners’ cognitive profiles prior to placing them into offender rehabilitation psychotherapeutic programs.

Study 1 has shown that prisoners have varying degrees of cognitive function, with some prisoners significantly impaired on several domains that are crucial to learning, in particular speed of processing. Speed of processing may have a fundamental role in how quickly a person can carry out a task and perform the skills learnt (Lichtenberger, Mather, Kaufman & Kaufman, 2012), may also relate indirectly to an individual’s self-efficacy and affect the process by which a skill is adequately or inadequately learned. For example, although speed of processing may not be directly responsible for explicit understanding of language, problem or learning tasks used during the program, deficits in this function may significantly impair and restrict cognitive resources responsible for accessing, storing and processing the information needed to perform the task at hand, by slowing down the rate at which cognitive mechanisms process information. By placing an individual in a positive learning environment that focuses on repetition, individuals are more likely to attend to the right information presented when completing tasks, and this will help them to process information faster. If strategies are put in place where learning a skill is modified to accommodate slow processing speed (e.g., by using cognitive strategies that help process information more effectively, presenting information more slowly, helping participants to ignore irrelevant information more efficiently, increasing repetition of tasks), individuals will be able to use their cognitive resources more effectively to master a task, which may in turn increase self-efficacy, because they will believe that they are more likely to achieve and complete tasks. Effectively engaging in any offender rehabilitation program is challenging for both prisoners and the clinician delivering the program, so that the following issues should be considered in the future.
The first issue in assessing and providing effective rehabilitation to prisoners is the need to understand their cognitive profile, skill level and skill needs. The Department of Corrective Services in Western Australia has recently replaced a number of assessment instruments designed to support case management and treatment intervention of prisoners who engage in programs during their custodial sentence. Whilst the new tools provide a comprehensive measure of a prisoner’s risk of recidivism, rehabilitation needs, and identifiers related to treatment planning (Department of Corrections, Victoria, 2015), they currently fail to provide a cognitive assessment, due to financial constraints. To improve program responsivity, the current research suggests introducing a targeted set of measures (such as cognitive screening tests) and a comprehensive semi-structured interview to understand substance use (e.g., age of onset, frequency of substance use). This will increase awareness of the cognitive impairments that a prisoner may face and allow the clinician to be responsive to their needs in order to enhance learning, acquiring and interpreting newly learned information and thus facilitate positive treatment outcomes. Responsivity is a major theme throughout the literature, and one which the Department of Corrective Services is strongly focused on due to its critical primary goal of reducing recidivism. By assessing the cognitive profile of prisoners, clinicians will be able to tailor psychotherapeutic interventions to more effectively meet prisoners’ needs. This is in accordance with the Risk-Need-Responsivity principle, which is the fundamental basis for offender rehabilitation programs.

In terms of responsivity, it has been argued that to engage in psychotherapeutic interventions like CBT, intact cognitive and executive functions are required (Passetti et al., 2008; Verdejo-Garcia, López-Torrecillas, Giménez & Pérez-García, 2004). Evidence suggests that this type of therapy may be less effective with individuals who have learning difficulties (Craig et al., 2013). However, our findings suggest rather that some aspects of the Think First program result in positive treatment outcomes, although these results must be interpreted with
caution, as the actual benefits of the program cannot be fully relied upon due to the self-report nature of the tools used. The results of Study 1 are that 70% of the total sample (81 of 115 prisoners) were clinically impaired in the domain of speed of processing, which affects a prisoner’s ability to engage in numerous daily activities, sports and in psychotherapy. As such, clinicians can expect that prisoners with deficits in this domain may have difficulty in:

- completing tasks in the allocated time;
- completing out of group intervention tasks within expected time frames;
- listening or taking notes during group intervention;
- reading and taking notes;
- solving simple problems;
- completing multiple tasks at once;
- engaging in challenging projects;
- keeping up with group conversations; and
- executing instructions if told to do more than one thing at once.

They may also:

- become overwhelmed when given too much information at once;
- need more time to make decisions and give answers; and
- need to read information more than once for comprehension.

Impairment in the domain of speed of processing may also affect executive functioning skills such as problem solving and decision-making (Catts et al., 2002; Lichtenberger & Kaufman, 2012; Moll, Göbel, Gooch, Landerl & Snowling, 2016). Not being able to execute the tasks listed above may also affect an individual’s self-efficacy, that is, their belief in their ability to succeed or accomplish a task.
The relationship between cognitive functioning and self-efficacy also needs to be considered. In Study 2, the prisoners were required to engage in the Think First program as part of their individual management plan. As discussed in Chapter 2, this program is based on cognitive behavioural principles and is focused on improving skills in the areas of interpersonal problem solving, self-control and perspective taking (Heseltine, Sarre & Day, 2011). Whilst numerous studies (Bartholomew & Aurora, 2001; Burgoyne & Tyson, 2013; Ireland & Archer, 2008; McGuire & Hatcher, 2001) and including Study 2 have found increased post-Think First scores across many measures, the actual benefits of the program are not certain due to the self-report nature of the tools used. What has been noted however is the relationship between cognitive functioning and post-Think First self-reported self-efficacy. The findings have demonstrated that there was a predictive relationship between self-efficacy and the measure of speed of processing, so that the better the performance on the speed of processing measure, the higher post-program reported self-efficacy. While speed of processing is generally seen as a fixed, immovable cognitive mechanism for individuals without brain injury (Anderson, 1992), there are cognitive and therapeutic strategies which may lead individuals to process information faster and more effectively, and decrease the negative effect which slow speed of processing has on cognitive tasks. These include therapeutic strategies relating to accepting, accommodating, and advocating, which help participants to cope with processing speed in a variety of settings.

Managing an individual with slow processing speed in therapy can be challenging, but by structuring tasks and requirements (i.e. slowing down the speed at which therapy is administered) it is possible for individuals to complete on time. By protecting or increasing self-efficacy, impaired speed of processing will have less of an effect on treatment outcomes, and result in a greater likelihood of participants adopting prosocial behaviours that reduce recidivism. Self-efficacy has been identified as a consistent predictor of treatment outcome.
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(Bates et al., 2006; Morgenstern & Bates, 1999). However, it is not clear whether features of the program such as skills rehearsal, role plays, repetitiveness, structured cognitive behavioural therapy, therapeutic alliance and the enhancing and mastery nature of the skills taught and learned contributed to the improvement in self-efficacy. Given what we know about speed of processing, it is possible that the repetitive nature of the program in teaching prisoners how to think and behave differently in various situations improved their self-efficacy, and that the cognitive skills practiced enhanced their ability and self-belief in being able to achieve goals and to successfully complete tasks. This is consistent with the psychological theory of self-efficacy, according to which the belief that one can perform well (high self-efficacy) will make it more likely for an individual to approach a challenging task as something to be mastered, rather than as something to be avoided. Additionally, if a prisoner has slow processing speed, the therapist should focus on giving the prisoner extra time and resources to work through the program material, by allocating the prisoner to an appropriately-sized group with equivalent cognitive ability. Instead of placing the individuals in a 12-person group, they could instead be placed in a group that better facilitates their learning, for instance in a one-on-one or one-on-two setting, or with people who have a similar cognitive profile to them, and specifically with similar processing speed. By implementing programs centred on individual needs, prisoners will be more likely to achieve treatment outcomes, and therefore less likely to engage in problematic behaviours that put them at risk of reoffending.

Methodological Limitations

Several methodological implications are evident in Studies 1 and 2 which may affect the validity and generalisability of the findings obtained.

The prisoners were not matched to a control group, as it was difficult to find prisoners who had not used a substance during their lifetime. Whilst having a control group would have
provided greater insight into differences in performance across the tasks, the normative population was used as a reference for comparison.

Self-reported accounts of participants’ substance use history may not be accurate, potentially contributing to results in which the chronicity (length) of substance use and number of substances used did not predict the level of impairment. Self-reported data made up the majority of the data in Study 2, which may have led to potential information bias reducing the validity of the results. However, even though self-reported motivational measures and questionnaires are part of the Think First program, their reliability and validity have been tested in previous studies with similar prison samples, and therefore reasonable levels of confidence may be placed in the validity of the results from this study (Howells et al., 2004; Heseltine, Sarre & Day, 2011; Palmer et al., 2007; McGuire, 2005).

The collection of ‘clean’ data was made difficult by the range of substance use reported by participants, as the majority were poly substance-dependent. For example, the group may not have been equivalent in substance addiction, given that there is a large amount of variability amongst users in drug types, drug effects, and numbers of drugs used at a time. In addition, collecting the data was extremely complex, since prisoners’ drug and alcohol use history was extensive and entrenched, thus potentially affecting their ability to recall substance specific information.

Potential substance use whilst in prison and prior to engaging in neuropsychological screening was untested and may have influenced the results, thus affecting test scores. Due to the legal implications of drug use within a prison system, this is a problematic issue which could be considered in future research.
Implications, Systemic Issues and Recommendations for Department of Corrective Services (WA)

Prisoners with cognitive impairments produced by a history of drug and alcohol dependence are currently overlooked within the prison system, and unfortunately, this may continue to result in an increase in recidivism. This has several implications, including:

- continuing increase in the number of prisoners in the prison system;
- increased financial pressure on the Government;
- additional pressure on the prison system;
- offenders not learning the skills needed to live a better quality of life; and
- community safety.

Based on the findings of the studies presented in this thesis, it is recommended that the Department of Corrective Services introduce an assessment process that captures the cognitive profile of prisoners, and that staff are provided with the necessary training to develop skills in administering and interpreting basic cognitive psychometric tools. This will allow clinicians to tailor and modify programs which prisoners are required to engage in throughout their custodial sentence, as well as enhance the ability of clinicians to work individually with prisoners on the skills they need to acquire, such as learning and integrating newly learned information. Whilst this may be time consuming and require additional resources, it is imperative for the rehabilitation of prisoners, and will reduce recidivism and increase community safety.

Recommendations for Future Research

Future research might consider:

- an additional study to compare prisoners with cognitive and executive impairment with prisoners or non-prisoners without impairments;
COGNITIVE FUNCTIONING AND SELF- REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

- controlling for variables such as cognitive impairment and therapeutic alliance to determine whether mastering skills increases self-efficacy;
- urinalysis and drug screening to further validate self-reports of drug use. This may however have legal implications relating to the prison system;
- reducing the number of self-reported measures;
- focusing on long-term transfer effects of the program by conducting a further follow-up post-test to see if improvements are still evident; and
- further investigating the causal pathways between cognitive functioning, self-efficacy, and treatment outcomes.

Summary

The overall goal of this dissertation was to provide the Department of Corrective Services (WA) and clinicians with important information on the cognitive profile of Western Australian prisoners, in order to increase awareness of the role cognitive function has in successful rehabilitation. This information may change the way prisoners are allocated to programs, in accordance with the Risk-Need-Responsivity principle which is designed to reduce the likelihood of recidivism. The dissertation also provides clinicians with an understanding of the prevalence of drug and alcohol dependence amongst the WA prisoner cohort. Being aware of the real-life impacts that impairments have on prisoners and how to tailor future offender rehabilitation programs to meet individuals’ needs will also be of benefit to prisoners and to the community. It is anticipated that with specific tailored intervention, the prisoner will be able to learn how to think and behave in a pro-social manner long-term, to achieve an increased quality of life, as well as keeping the community safe.
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Appendix A: Information & Permission Request Letter

To Superintendent,

My name is Raileen Merlino and I am an employee of the Department of Corrective Services, Community Programs, and I am also a student currently completing my Doctorate of Clinical Psychology, at Murdoch University. As a part of my studies I am conducting research on cognitive abilities, motivation to change behaviour, and the outcomes on the Cognitive Skills program, Think First. This research will not only benefit the participants (in recognising the level of damage as a result of substance dependence), but also educate clinicians on the factors facilitating engagement in programs such as Think First which aim to enhance skills that form the basis of engagement in therapeutic programs.

The participants required for my study are non-Indigenous males and females that are involved in the Cognitive Skills program, Think First. On this project, I will work closely with the facilitators of the program and will be utilising the data they collect as part of the program. However, I will also conduct cognitive skills assessments through paper and pencil questions and computerized tests on a laptop. The laptop will only have the psychometric tests on it and no other programs.

As an employee of the department I am aware that in order for equipment to be brought into the prison I need to gain permission. Therefore, I am asking whether you can indicate via email, whether you consent to me bringing the laptop in for these purposes. As a time frame, I am hoping to collect all my data from August/September 2009 to March December 2010. However, if for unforeseen reasons that it may be longer I will notify you.

As part of my research I am required to submit an Ethics application to both Murdoch University and Department of Corrective Services. As part of this application process, could you please send me a confirmation reply with a response relating to whether or not I can bring in a laptop to assist me in collecting data. Once I have received your response, I will forward it to the Ethics Committee(s) as stated above.

I look forward to your response.

Kind regards
Raileen Merlino
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Raileen.merlino@correctiveservices.wa.gov.au
Appendix B: Participant Information Letter

You are invited to participate in a study on the relationship between substance use and the ability to think, make decisions, and create goals and motivation to change behaviour. The research is being conducted by Raileen Merlino, a Doctorate of Psychology student at Murdoch University, working in conjunction with Dr Marjorie Collins, a Clinical Psychologist.

If you are interested in participating, we will ask you to complete some puzzles and activities that will assess your thinking skills, and some questionnaires that look at your motivation to change. With your consent, we will access your offender file and ask some questions about your education, work, medical history and previous substance use, as well as other programs you have participated in.

If you consent to participate, we will protect your confidentiality. No names or other information that might identify you will be used in any publication arising from the study. You can decide at any time to withdraw your consent to participate. Withdrawing from the study will have no consequences for your participation in programs while here.

If you agree to participate in this study, please indicate your consent on the form attached. If you have any questions about this project please feel free to speak to the facilitators of the program, who can contact me, Miss Raileen Merlino or Dr Marjorie Collins on your behalf. Likewise, should you have any concerns about the project you can also contact the Chaplain who will be able to contact the Ethics Committee on your behalf.

You can find out about the results of this project by emailing Raileen Merlino, raileen.merlino@correctiveservices.wa.gov.au. It is expected that results will be available around December 2017.

This study has been approved by the Ethics Committees of the Department of Corrective Services and Murdoch University (Approval Number: 221107).
Appendix C: Consent Form

The relationship between executive functioning, motivation, and treatment outcome in offenders who have been drug dependent.

The information about this project has been given to me. I have received satisfactory answers to all questions I have asked. I agree to participate. I know that I can choose to stop at any time. I understand that all information provided by me is treated as confidential.

1. I agree voluntarily to take part in this study.

2. I understand I am free to withdraw from the study at any time without needing to give any reason.

3. I agree that my offender file may be accessed to gather additional information relating to my substance use and other treatment programs that I have previously completed.

4. I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

5. I understand that my name and identity will be stored securely in a locked cabinet and that it is only accessible to the investigators. All data provided by me will be analysed anonymously using code numbers.

6. I understand that all information provided by me is treated as confidential.

Signature of Participant: _______________________ Date: …..../..…../…..

(Name)

Signature of Investigator: _______________________ Date: …..../..…../…..

(Raileen Merlino)

Signature of Supervisor: _______________________ Date: …..../..…../…..

(Dr Marjorie Collins)
Appendix D: Semi-Structured Interview* Form

NB: this semi-structured interview is already being used in the Senior Researcher’s studies with substance dependence individuals in rehabilitation.

Semi-Structured Interview

Pre Group

Demographics

Name__________________________________

Date of Birth____________________________

Age________

Education History (i.e., What year did they go up to, i.e., yr 8, 10, or 12; any other studies i.e., TAFE, Uni; are they currently engaging in external studies?)

___________________________________________________________________________

Medical History (in particularly, head injury; have they been hospitalised, family mental health history i.e., depression, anxiety, substance use psychosis)

___________________________________________________________________________

Medication Status (are they currently on any form of medication including, Naltrexone, Methadone, anti-depressants, anti-psychotics etc.-how much, how often)

___________________________________________________________________________

Substance specific question
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Drug of choice___________________

Drug history

Age when first started using drugs (circle)

<14 yrs, 15-19 yrs, 20-24 yrs, 25 or older

What was the first substance that you used? (Note if polysubstance, frequency, quantity)

___________________________________________________________________________

Which substance have you used in the past? (Note age started, frequency, quantity)

Alcohol_______________________________________________________________

Prescription Medication

___________________________________________________________________________

Opiates_______________________________________________________________

Stimulants_______________________________________________________________

Inhalants_______________________________________________________________

Hallucinogens_______________________________________________________________

Cannabis_______________________________________________________________

Other(s)_______________________________________________________________

Have you used any form of treatment for drug use in the past i.e., Methadone/naltrexone (when/how much)___________________________________________________________________________
Was there any time in your life when you did not use any form of substance? If yes, for how long did you abstain and under what circumstances?

___________________________________________________________________________

Have you noticed any changes in your thinking since you started to use substances?

___________________________________________________________________________

Have you noticed that things are harder to do than they used to be?

___________________________________________________________________________

What kind of things are taking longer to do than they used to?

___________________________________________________________________________

Did your substance use affect your daily functioning? (means of obtaining drugs, work commitment, relationship commitments, health)

___________________________________________________________________________

Therapy

Have you engaged in any form of therapy inside? what programs? how did you find it

___________________________________________________________________________
## Appendix E: Drug Dependency Questionnaire

<table>
<thead>
<tr>
<th>Drug Category</th>
<th>Ever Used</th>
<th>Age First Used</th>
<th>Total Years Used</th>
<th>Most Typical Route of Administration</th>
<th>Year Last Used</th>
<th>Frequency of Use in Past ____ Days</th>
<th>Ever Prescribed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCOHOL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>CANNABIS: Marijuana, hashish, hash oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>STIMULANTS: Cocaine/Crack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>STIMULANTS: Methamphetamine-speed, ice, rock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>BENZODIAZEPINES/ MINOR TRANQILIZER: Valium, Librium, Halcion, Xanax</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>OVER-THE COUNTER &amp; Tx NARCOTICS: 222’s, codeine, Tylenol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>NARCOTICS: Heroin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>NARCOTICS: Street or illicit methadone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>OTHER NARCOTICS/OPIATES : opium, morphine, Demerol, dilauidd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>INHALANTS: glue, gasoline, aerosol, paint thinner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>BARBITURATES/OTHER SLEEPING PILLS: Seconal, Nembutal, phenobarbital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>HALLUCINOGENS: LSD, PCP, STP, MDA, DAT, mescaline, psilocybin, peyote, mushrooms, ecstasy</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>x</td>
</tr>
</tbody>
</table>
### Cognitive Functioning and Self-Reported Self-Efficacy in Prisoners with a History of Substance Dependence

**SEDATIVES/HYPNOTICS:** Doriden, Dalmate, Quaalude, Amytal, Fiorinal

**MAJOR TRANQUILIZERS:** Thorazine, Stelazine, Lithium, Mellaril, Haldol

**NICOTINE**

**OTHER PSYCHOACTIVE DRUGS:** (Specify)

Note: If ‘EVER USED’ is NO (1) for any given line, the remainder of the line should be left blank.

**Frequency codes**

1 = <1x/month  
2 = 1x/month 
3 = 1x/week 
4 = 2 to 3x/week  
5 = 4 to 6x/week  
6 = 1x/day 
7 = >1x/day
Memory and Learning. The Rey’s Auditory Verbal Learning Test (RAVLT) was used as a measure of verbal learning and memory (Rosenberg et al., 1984, Strauss et al., 2006). According to Strauss et al. (2006) the RAVLT total score shows high internal consistency (van den Burg & Kingma, 1999) and adequate test-retest reliability over 1 year for the total and delayed scores ($r = 0.82$; Strauss et al., 2006).

Similar to the majority of cognitive and memory tasks, the RAVLT is influenced by demographic variables such as education (Lezak et al., 2004; Malloy-Diniz et al., 2007; Schoenberg et al., 2006; Strauss et al., 2006) and age (Lezak et al., 2004; Malloy-Diniz et al., 2007; Schoenberg et al., 2006; Strauss et al., 2006). The RAVLT was chosen as it is considered a valid test of memory and learning and has been shown to be sensitive to impairments in memory and learning observed in a number of clinical populations, including traumatic brain injury (Strauss et al., 2006).

Participants are required to listen to a verbal presentation of a 15-item learning task. It has two lists (A and B), each with 15 unrelated words. List A is first presented, followed by free recall (B). The procedure is repeated five times (A1, A2, A3, A4, and A5). List B (interference) is then presented followed by free recall (B). The subject is then asked to recall List A (A6). After a 20-30 minute delay, the participants are asked to recall List A, labelled as delayed recall task (A7). The test was administered and scored in accordance with standardized instructions (Strauss et al., 2006).

Auditory Attention. To measure attention, the Digits Forwards (DSFW) Test of the Digit Span subtest of the Wechsler Adult Intelligence Scale (3rd ed.) (WAIS-III) was administered. Participants are required to listen to an oral string of numbers (one digit per
second) and are required to recite the number string in order of presentation. Presented in two trial blocks, the length of the digit span is increased by one when a participant correctly recites at least one of the trials from the two trial blocks. The first span included three digits. The following included one more digit and so on, until the participant no longer recites the correct order of the digits. The DSFW test was scored according to the correct recitals in each trial. The DSFW demonstrates sound criterion and construct validity (r’s >0.09) and high internal consistency and test-retest reliability, r = 0.80 and r=0.90 (Lezak, 2004; Wechsler, 2001).

**Speed of Information Processing.** The Symbol Digits Modalities Test (SDMT: Smith, 1991) was administered as the primary assessment of the speed of information processing domain (Lezak, 2004). It is also used to assess attention, complex scanning, and visual tracking. The SDMT manual provides a written and verbal condition. For brevity, only the written version was used. On the written version of the SDMT, participants are provided with a coding key consisting of nine abstract symbols in the upper row, and matched numbers (1 through 9) in the lower row. A two-row grid with the same nine stimulus symbols is presented in the upper row and blank cells for numeric responses are presented in the lower row (Smith, 1982). The participant is required to substitute a number for its corresponding geometric figure. Participants complete the task by writing the number that corresponds to the geometric figure in the box below each figure. The key with the geometric figures and corresponding numbers appears at the top of the page. The SDMT was scored according to the number of correct substitutions within 90 seconds. The written version has strong discriminate validity and is considered one of the most sensitive tests for detecting change in cognitive functioning over time in adults, and early detection of senile dementia (Strauss et al., 2006) and mild neurocognitive impairments (Lezak, 2004). Additionally the test-retest reliability after a 29 day interval is representable (r>0.80; Lezak, 2004; Smith, 1991).
Working Memory. Digits Backwards (DSBW) Test of the Digit Span subtest of the WAIS-III was administered to assess auditory working memory. Participants are required to listen to an oral string of numbers (one digit per second) and are required to recite the number string backwards. Presented in two trial blocks, the length of the digit span is increased by one when a participant correctly recites at least one of the trials from the two trial blocks. The first span included three digits. The following span included one more digit and so on, until the participant fails to recall the digits backwards. The DSBW test was scored according to the correct recitals in each trial. The DBFW demonstrates sound criterion and construct validity ($r$’s $>0.09$) and high internal consistency and test-retest reliability, $r = 0.80$ and $r=0.90$ (Lezak, 2004; Wechsler, 2001).

Cognitive Flexibility, Cognitive Shifting and Information Retrieval. To assess cognitive flexibility, cognitive shifting and information retrieval, the Verbal Fluency Test from the Delis-Kaplan Executive Function System (DKEFS) was administered. These tests have been shown to test verbal initiation, speed of processing, simultaneous processing and provide an indicator of verbal cognitive flexibility, verbal fluency and cognitive shifting (Delis et al., 2001). The verbal fluency subtest is comprised of three separate conditions. Condition 1, letter fluency: participants are required to say as many words as they can that begin with a particular letter within a 60-second period. Three separate 60-second trials are administered with the letters F, A & S. Condition 2, category fluency: participants are required to say as many words as they can that belong to a designated category within a 60-second period. Two separate 60 second trials are administered with target categories being animals’ and boys’ names. Condition 3, category switching: participants are required to alternate between saying words from two different categories, alternating between saying a fruit then a piece of furniture, fruit then furniture and so on until the end of 60 seconds.
The primary measure for Condition 1, letter fluency and Condition 2, category fluency is the number of correct words generated within each of the 60 second trials. For condition 3, category switching, the score is calculated according to the number of correct switches between categories and the number of correct responses overall. Overall each condition of the subtest demonstrates sound internal consistency ranging from $r = 0.60$ to $r = 0.91$ and adequate test-retest reliabilities $r = 0.60$ to $r = 0.90$ according to the test data (Delis et al., 2001). The primary scoring measure for each of the conditions is the number of correct responses aggregated across the different trials within each condition.

Condition 1, Letter Fluency (LF) taps into higher level functioning such as initiation, simultaneous processing (multi-tasking), systematic retrieval and speed of processing. Performance on this condition depends on fundamental cognitive functioning, including vocabulary knowledge, spelling ability and attention. Average to above average scores demonstrate strengths in EF abilities, whereas low scores could be related to deficits in fundamental abilities or higher level EFs. Individuals with learning disabilities or low premorbid intellectual skills often exhibit fundamental verbal deficits.

Condition 2, Category Fluency (CF) also require adequate fundamental skills and higher level abilities as in Condition 1. It is important to formulate a contrast analysis of relative performance on Letter Fluency versus Category Fluency to determine performances by individuals with progressive dementia which is often impaired on both LF and CF.

Condition 3, Category Switching (CS) simultaneously requires rapid retrieval from semantic knowledge and cognitive flexibility in shifting between two semantic categories. The combination of fluency and switching in the same task can increase the sensitivity to frontal lobe dysfunction. Some individuals are able to generate words from the two categories of the switching condition adequately, but fail to shift back and forth between the categories when
retrieving words. Adequate scores for the total number of correct responses, regardless of their switching accuracy, their total switching accuracy and percent switching accuracy scores often will be deficient. If individuals obtain normal total scores for Conditions 1 and 2 (LF and CF), then the source of their impairment in Condition 3 (CS) is likely to be a deficit in cognitive flexibility, not in verbal fluency.

**Inhibition, Multitasking and Higher Level Attention.** The Delis-Kaplan Executive Function System (DKEFS), subtest Color-Word Interference Test (CWIT) is considered to be a sensitive measure of the *inhibition* component of executive functioning and *attentional control* (multi-tasking) and higher level attention (Lezak, 2004). In the CWIT Condition 3, *Inhibition*, participants are presented with a row of words printed in dissonant ink colours and required to name the colour of the ink the letters are printed in and are not to read the word. In Condition 4, *Inhibition/Switching*, participants are presented with a row of words printed in dissonant ink colours (half of which are contained in rectangles) and required to name the colour of the ink and not read the words, as in Condition 3. However, they are also required to read the word and not name the ink colour if the word is in a box. Participants are instructed to complete the task as quickly as they can without making any mistakes. The CWIT has moderate to high test-retest reliability with coefficients of 0.76 for the colour naming condition, 0.62 for the word reading condition, 0.75 for the inhibition condition, and 0.65 for the inhibition/switching condition when re-administered after an average period of 25 ± 12.8 days (Delis et al., 2001).

Condition 3, inhibition, and Condition 4, inhibition/switching are considered to target the ability to inhibit inappropriate responses and attentional control by requiring the participant to switch between naming a dissonant ink colour and reading the text. This ability may be reduced by impairments in the individual’s executive functioning system (Delis et al., 2001).
The inhibition versus colour naming contrast score allows the researcher to assess whether or not the participant has a verbal inhibition deficit over and above the naming impairment. Condition 3 reflects the participant’s ability to inhibit the more salient, automatic task of reading words in order to name the dissonant ink colours quickly. An adequate score according to the test manual on Condition 1 but a poor score on Condition 3 is often related to an EF deficit in verbal inhibition, that is, the participant’s impairment in inhibiting the more automatic reading response. If impairments exist on Conditions 1 and 3, then there are deficits in both naming speed and verbal inhibition. Condition 4 is a difficult task and requires successful performance on naming speed, reading speed, verbal inhibition and cognitive flexibility. If performance is adequate on Conditions 1, 2 and 3 but poor on Condition 4, then deficiencies may be due to cognitive flexibility. Mild deficits in Condition 3 and a severe deficit in Condition 4 is suggestive of impairments in both verbal inhibition and cognitive flexibility.

**Abstract Reasoning and Concept Formation.** Twenty Questions, a subtest of the Delis Kaplan Executive Function System (DKEFS) was utilized to measure abstract reasoning and concept formation skills. This test measures the key EFs of categorical processing, abstract thinking and the utilization of feedback for effective strategy use in problem solving. Participants are presented with a stimulus page depicting pictures of 30 objects. Participants are required to ask the fewest number of yes/no questions possible in order to identify the unknown target object over four consecutive trials, each with a different unknown target object. The initial abstraction score quantifies the level of abstract thinking represented in the first question asked by the participant for each item. The most efficient problem solving strategy on this test is to ask yes/no questions that eliminate the maximum number of objects, regardless of whether the participant answer is yes or no. This test has a range of low to high internal consistency, test–retest reliability, and correlation coefficients.
Decision-making. Decision-making performance and risk taking behaviours were assessed using the computerized version of the Iowa Gambling Task (IGT) (Bechara et al., 2000). The test stimulates scenarios involving risk, uncertainties, rewards and penalties (Damasio, 1994). The IGT test involves 100 trials of selecting single cards from four different decks labelled D1, D2, D3 and D4. Participants select a card from any deck until the game ends. Each deck has predetermined rewards and penalties. Choosing a card from decks D1 or D2 yields a high reward per card but a net loss in the long-term. Choosing a card from decks D3 or D4 yields a small reward per card but a net gain in the long-term. Participants are encouraged to win as much money as possible. Participants were told that some decks incur more loss than others, and that they can win if they avoid selecting from the worst decks. Participants were given a monopoly amount of $2,000 to start the test.

There is limited reliability information on the IGT as it is not a conventional psychometric test (Dunn et al., 2006). Despite this, the IGT has demonstrated construct validity by detecting decision-making impairments in a wide range of clinical populations with impairments attributable to frontal systems dysfunction in alcoholics (Bechara et al., 2001), depressed individuals (Jollant et al., 2005) and substance users (Quednow et al., 2007).

The IGT performance was scored by grouping each sequential set of 20 trials into five blocks (e.g. the first block included trials 1 to 20) (Bechara & Damasio, 2002). The score for each block, or block net score was determined by subtracting the total number of cards selected from bad decks (D1 + D2) from the total number of cards selected from good decks (D3 + D4) (Bechara & Damasio, 2002). A total score obtained for the entire task, or the total net score, was derived by aggregating net scores for all blocks. A higher total net score indicates a better performance and better decision-making skills.
Estimated premorbid intellectual ability: Wechsler Test of Adult Reading (WTAR: Wechsler, 2001). The WTAR was used to obtain an estimate of premorbid intelligence for each participant in the sample, since it is considered to be a sensitive measure of premorbid intellectual functioning and is also a baseline measure of an individual’s intellectual functioning prior to trauma or disease (Lezak, 2004). Participants are provided with a word list of 50 words that contain irregular graphemes and asked to pronounce them. The WTAR is scored according to the number of correctly pronounced words. The WTAR has been shown to be useful in detecting cognitive decline in clinical populations (Strauss et al., 2006) and demonstrates sound construct, criterion, and discriminate validity as well as strong test-retest reliability and internal consistency (all r>0.90; Strauss et al., 2006). The WTAR correlates positively with other reading recognition measures such as the National Adult Reading List and the Wechsler Individual Achievement Test Basic Reading Scale (Wechsler, 2001). The Test of Premorbid Function (TOPF: Wechsler, 2011) is the updated version of the WTAR, and is considered to be an effective test of intellectual functioning prior to the onset of injury or illness, and is predictive of full scale IQ and memory performance, but was not available at the time of testing (Wechsler, 2011).

Test of Memory Malingering (TOMM: Tombaugh, 1996). The TOMM was utilized to assess participants’ motivation to put in a good effort on testing. (Tombaugh, 1996; O’Bryant et al., 2007). The use of Trial 1 has been demonstrated to be an effective option for screening for insufficient effort in psychometric assessments (O’Bryant et al., 2007)

Depression, Anxiety and Stress Scale 21 (DASS 21): (Lovibond & Lovibond, 1995). Research has shown that anxiety and depression may affect an individual’s performance on psychometric tests (Lyubomirsky et al., 2003; Lovibond & Lovibond, 1995). Psychological distress was measured using the Depression, Anxiety and Stress Scale 21, as it is considered a
sensitive measure of current emotional state (Antony et al., 1998). The DASS 21 is a 21-item self-report questionnaire. It is used to measure the severity of symptoms common to depression, anxiety and stress over the preceding week. On the DASS 21, participants are required to answer the questionnaire and to provide answers that relate to symptoms in the preceding week. The measure uses a 4-point scale from 0 (did not apply to me at all over the last week) to 3 (applied to me very much or most of the time over the last week). The DASS 21 provides 3 separate measures of depression, anxiety and stress, and is considered a valid measure of depression, psychological tension, agitation and physical arousal. It has a high internal consistency, with correlations coefficients at \( r = 0.82 \) for the depression scale, \( r = 0.82 \) for the anxiety scale, and \( r = 0.90 \) for the depression scale. The entire scale’s coefficient is \( r = 0.93 \) (Henry & Crawford, 2005).
Appendix G: Power Analysis – Study 1

Phase 1 Power Analysis

Phase 2 Power Analysis

Phase 3 Power Analysis
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE
Appendix H: IOWA Comparison Sample

A comparison sample was included to compare the prison sample’s performance on the Iowa Gambling Tasks to a comparison sample in the local community. The comparison sample was part of an earlier study conducted by Vo and Collins (2010) on a decision-making task. It consisted of 44 volunteers (30 male and 14 female) who were recruited through advertisements on bulletin boards at Murdoch University, letter-dropping, and snowball sampling. The comparison sample was comparable to the prison sample in terms of age, with the prison sample ($M = 33.61, SD = 8.64$) and the comparison sample ($M = 34.77, SD = 12.14$). Both samples included no prior history of psychiatric disorder, neurological disease, current substance dependency, mental retardation, or learning difficulties.

The samples however differed in education level, with prison sample ($M = 9.7, SD = 1.50$) having fewer year of education compared to the comparison sample ($M = 12.18, SD = 1.39$). The samples also differed on estimated premorbid intellectual functioning, with the prison sample ($M = -0.34, SD = 0.99$) being lower than the comparison sample ($M= 0.41, SD = 0.41$). It is anticipated that the difference in intellectual function scores may be attributable to the level of education achieved on average in the prison sample, rather than intellectual ability.

Vo’s (2010) research also considered performance on the IOWA, decision-making tasks across substance-dependent and a normal community group, and established that this comparison sample was an adequate measure of the general population. Following on from their research, their control sample was utilised as a measure of decision-making within the normal population.
## Appendix I: Phase 2 Assumption Testing & Syntax

### Assumption Testing

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### Syntax

```r
# Syntax for Assumption Testing

# Descriptive statistics

# 1.1.1.1 Orient

# Descriptive statistics
```

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217
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Tests of Normality

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* This is a lower bound of the true significance.

a. Lilliefors Significance Correction

![Histogram of Age of Onset](image1)

![Normal Probability Plot of Age of Onset](image2)

![Histogram of Total_months_Used](image3)

![Normal Probability Plot of Total_months_Used](image4)
Category Switching vs Category Fluency.

---

Histogram

- **Category Switching vs Category Fluency**
- **Normal Q-Q Plot of Frequency**
- **Histogram**
- **Normal Q-Q Plot of Number of Substances Used**
- **Histogram**
- **Normal Q-Q Plot of Z SCORE DKEF Category Switching vs Category Fluency**
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

### Correlations

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| **Sig. (1-tailed)**     | Z SCORE DQEF Category Switching vs Category Fluency | .008         | .108              | .466      |
|                         | Age of Onset                                       | .008         | .001              | .000      |
|                         | Total months Used                                  | .001         | .050              | .000      |
|                         | Frequency                                           | .000         | .000              | .037      |
|                         | Number of substances used                           | .000         | .000              | .037      |

| **N**                  | Z SCORE DQEF Category Switching vs Category Fluency | 115          | 115               | 115       |
|                        | Age of Onset                                       | 115          | 115               | 115       |
|                        | Total months Used                                  | 115          | 115               | 115       |
|                        | Frequency                                           | 115          | 115               | 115       |
|                        | Number of substances used                           | 115          | 115               | 115       |

### Coefficients

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*Dependent Variable: Z SCORE DQEF Category Switching vs Category Fluency*
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

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a. Dependent Variable: Z SCORE DKEF Category Switching vs Category Fluency

Scatterplot

Dependent Variable: Z SCORE DKEF Category Switching vs Category Fluency

Rey Auditory Verbal Learning.
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Correlations

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Collinearity Diagnostics

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a. Dependent Variable: RAVLT Delay Z Score
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Residuals Statistics

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a. Dependent Variable: RAVLT Delay Z Score

Scatterplot

Dependent Variable: RAVLT Delay Z Score

Verbal Condition 3.
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

### Correlations

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<th>Frequency</th>
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a. Dependent Variable: Z SCORE DKEF Verbal Condition 3 total correct

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Page 224
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

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a. Dependent Variable: Z-Score DKEF Verbal Condition 3 total correct

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a. Dependent Variable: Z-Score DKEF Verbal Condition 3 total correct
Regression Analyses Syntax

EXAMINE VARIABLES= Age_of_Onset Total_months_Used Frequency Number_of_substances_used ZDKEF_CSvCF ZRAVLT_DEL ZDKEF_VC3_Cswitching_totalcorrect 
/PLOT BOXPLOT HISTOGRAM NPLOT
/COMPARE GROUPS
/PERCENTILES(5,10,25,50,75,90,95) HAVERAGE
/STATISTICS DESCRIPTIVES EXTREME
/CINTERVAL 95
/MISSING PAIRWISE
/NOTOTAL.

CORRELATIONS
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ZDKEF_VC3_Cswitching_totalcorrect
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/MISSING=PAIRWISE.

NONPAR CORR
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REGRESSION
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/NOORIGIN
/DEPENDENT ZRAVLT_DEL
/METHOD=ENTER Age_of_Onset Total_months_Used Frequency
Number_of_substances_used
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

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/SAVE PRED ZPRED MAHAL COOK ZRESID.

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COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Appendix J: Willingness to Change (Likert Scale)

Name_________________ Date_________________

Willingness to Change

Pre-Group/ Post-Group (circle which one is relevant)

The simplest way to assess the client's willingness to change is to use a Readiness Ruler or a 1 to 10 scale, on which the lower numbers represent no thoughts about change and the higher numbers represent specific plans or attempts to change. Ask the client to indicate a best answer on the ruler to the question ‘How important is it for you to change?’ or ‘How confident are you that you could change if you decided to?’

Willingness Ruler
How important is it for you to change on a scale of 1 to 10?

1 2 3 4 5 6 7 8 9 10
Not Willing Unsure Willing

Willingness Ruler
How confident are you in that you could change your behavior if you decide to on a scale of 1 to 10?

1 2 3 4 5 6 7 8 9 10
Not Confident Unsure Confident
## Appendix K: General Self-efficacy Scale (GSES)

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<th>Hardly true</th>
<th>Moderately true</th>
<th>Exactly true</th>
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<tbody>
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<td>1. I can always manage to solve difficult problems if I try hard enough</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If someone opposes me, I can find the means and ways to get what I want.</td>
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<td></td>
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<tr>
<td>3. It is easy for me to stick to my aims and accomplish my goals.</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>4. I am confident that I could deal efficiently with unexpected events</td>
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<td></td>
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<tr>
<td>5. Thanks to my resourcefulness, I know how to handle unforeseen situations.</td>
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<td></td>
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<tr>
<td>6. I can solve most problems if I invest the necessary effort.</td>
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<tr>
<td>7. I can remain calm when facing difficulties because I can rely on my coping abilities.</td>
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<td></td>
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</tr>
<tr>
<td>8. When I am confronted with a problem, I can usually find several solutions.</td>
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<tr>
<td>9. If I am in trouble, I can usually think of a solution</td>
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<td></td>
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<tr>
<td>10. I can usually handle whatever comes my way.</td>
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</table>
Appendix L: Readiness to Change (Likert Scale)

Name_________________ Date_________________

Readiness to Change

Pre-Group/ Post-Group (circle which one is relevant)

The simplest way to assess the client's readiness to change is to use a Readiness Ruler or a 1 to 10 scale, on which the lower numbers represent no thoughts about change and the higher numbers represent specific plans or attempts to change. Ask the client to indicate a best answer on the ruler to the question, ‘How ready are you to make changes in your life right now’?

<table>
<thead>
<tr>
<th>Readiness Ruler</th>
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</thead>
<tbody>
<tr>
<td>How ready are you to make changes in your life right now on a scale of 1 to 10?</td>
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</tbody>
</table>

1 2 3 4 5 6 7 8 9 10

Not Ready Unsure Ready
Appendix M: Power Analysis Study 2

Hypothesis 1

Hypothesis 2
Appendix N: Assumption Testing – Study 2

Hypothesis 1: Assumption Testing

Before interpreting the results of the Multivariate Analysis of Variance, a number of assumptions were tested, and checks were performed.

Normality

First, Normal Q-Q plots and boxplots indicated that each variable was adequately normally distributed and free from univariate outliers. The data also indicated there was multivariate normality (as indicated by each of dependent variables for each of the groups across each independent variable).

<table>
<thead>
<tr>
<th>Tests of Normality</th>
<th>Kolmogorov-Smirnov*</th>
<th>Shapiro-Wilk</th>
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<tbody>
<tr>
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<td>Statistic</td>
<td>df</td>
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<tr>
<td>Pre_BISI_Motor_imp</td>
<td>.180</td>
<td>52</td>
</tr>
<tr>
<td>Pre_BISI_Cognitive_imp</td>
<td>.148</td>
<td>52</td>
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<tr>
<td>Pre_BISI_Nonplanning</td>
<td>.098</td>
<td>52</td>
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<tr>
<td>Pre_BISI_Total</td>
<td>.103</td>
<td>52</td>
</tr>
<tr>
<td>Pre_Crim_PICS_Att_of_Offend</td>
<td>.180</td>
<td>52</td>
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<tr>
<td>Pre_Problem_Inventory</td>
<td>.092</td>
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<tr>
<td>Pre_SP51_Sat_Total</td>
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<td>Post_SP51_Sat_Total</td>
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</table>

* This is a lower bound of the true significance.
1. Lilliefors Significance Correction
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Histogram

Normal Q-Q Plot of Pre_BISI_Nonplanning

Histogram

Normal Q-Q Plot of Pre_BISI_Deepening

Histogram

Normal Q-Q Plot of Pre_BISI_Total

Histogram

Normal Q-Q Plot of Pre_BISI_Total
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Histogram

Normal Q-Q Plot of Post_BSSI_Cognitive_imp

Histogram

Normal Q-Q Plot of Post_BSSI_Horplanning

Histogram

Normal Q-Q Plot of Post_BSSI_Horplanning

Histogram

Normal Q-Q Plot of Post_BSSI_Horplanning

Histogram
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

[Graphs and charts showing statistical distributions and Q-Q plots for different metrics, including Post_Brief_Total and Post_Crime_PICS_Att_of_Offend.]
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

Linearity
Scatterplots indicated there is a linear relationship between each pair of dependent variables for each group of the independent variable.
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE
COGNITIVE FUNCTIONING AND SELF-REPORTED SELF-EFFICACY IN PRISONERS WITH A HISTORY OF SUBSTANCE DEPENDENCE

[Diagram 1]

[Diagram 2]

[Diagram 3]
Homogeneity of variance-co-variance matrices

Box’s M test of equality of c-variance indicated the assumption to be accepted.

Multicollinearity

The correlation table below indicates the dependent variables to be moderately correlated (0.2 > r < 0.9), indicating multicollinearity was not an issue.

<table>
<thead>
<tr>
<th></th>
<th>Pre Readiness</th>
<th>Pre Willingness to change 1 Importance</th>
<th>Pre Willingness to change 2 Importance</th>
<th>Pre Global Self-Efficacy Scale</th>
<th>Pre Emotional Regulation Scale</th>
<th>Post Readiness</th>
<th>Post Willingness to change 1 Importance</th>
<th>Post Willingness to change 2 Importance</th>
<th>Post Global Self-Efficacy Scale</th>
<th>Post Emotional Regulation Scale</th>
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<td>-1.92†</td>
<td>-1.56†</td>
<td>-1.05</td>
<td>0.75†</td>
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<td>0.79†</td>
<td>0.70†</td>
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<td>0.39†</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<td>0.00</td>
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</tbody>
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* Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).