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**EXECUTIVE COGNITIVE FUNCTIONING AS A RISK FACTOR IN  
RECIDIVISM A LONGITUDINAL STUDY OF FEDERALLY  
INCARCERATED OFFENDERS**

Megan Janae Lau

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EXECUTIVE COGNITIVE FUNCTIONING AS A RISK FACTOR IN RECIDIVISM:  
A LONGITUDINAL STUDY OF FEDERALLY INCARCERATED OFFENDERS

(Spine title: Executive Functioning as a Risk Factor in Recidivism)

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by

Megan Janae Lau

Graduate Program in Psychology

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School of Graduate and Postdoctoral Studies  
The University of Western Ontario  
London, Ontario, Canada

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## Abstract

The cost of crime should not be underestimated; considerable resources have been directed towards implementing various remediation programs in hopes of reducing recidivism. While support for the efficacy of these programs exists, it remains that they are not effective for all individuals. To explain this variability, one factor that has begun to gather research interest is executive cognitive functioning (ECF). This study investigated the relationship between ECF and recidivism, as well as institutional misconduct, in a sample of 81 male offenders. No significant differences in ECF were found between institution conformists and non-conformists, or recidivists and non-recidivists; however, early recidivists showed significant impairments in areas of strategy formation, response monitoring, working memory, impulsivity and attention. These deficits likely reflect impairments in overall problem-solving abilities and suggest that ECF deficiencies may play a role in the timing of recidivism. The findings are interpreted in terms of implications for improving remediation programming.

**Keywords:** recidivism, executive cognitive functioning, offenders, cognitive ability, risk factor, institutional misconduct

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Looking back on this process, with the sunlight in my eyes and the tunnel behind me, I can see that the many struggles I experienced during the past two years were worth it. That being said, I doubt I would voluntarily choose to repeat this experience! While the cause of my consternation changed from day to day, one constant that helped me through this process was my supervisor, Dr. Peter Hoaken. Thank you for your guidance and support throughout this experience; I am especially grateful for your boundless enthusiasm and endless creativity in brainstorming possible directions for my research. Above all else, it was inspiring to be around someone so in love with psychology and its applications.

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Executive Cognitive Functioning as a Risk Factor in Recidivism: A Longitudinal Study  
of Federally Incarcerated Offenders

The cost of crime should not be underestimated- whether it is youth crime, adult crime, gang-related crime, drug-related crime, violent crime, or non-violent crime, the cost for those involved and society as a whole is astronomical. Given that the costs of crime begin accumulating with the initial police investigation and do not stop until the perpetrator has served his or her whole full sentence, the cost to society can run into the millions of dollars (Thomas, 2000). When the victims' costs of medical and mental health care, absenteeism and productivity loss are added to this total, it becomes apparent that crime has evolved beyond a "law and order" issue to become a fundamental issue of public health (World Health Organization [WHO], 2002).

Due to the immense personal and societal costs of crime, there has been a movement to reduce these offending behaviours in the general public. For this, society looks to the criminal justice system to enforce the values, standards and customs held by the majority of its members (Cormier, 2006). Traditionally, the criminal justice system has attempted to reduce crime through the use of punishment, most notably imprisonment. While Canadian rates of incarceration have been steadily decreasing (from 132 individuals per 100,000 general population in 1995 to 108 individuals per 100,000 general population in 2003), the fact remains that Canada's incarceration rates continue to be higher than the majority of western European nations comparable in terms of population size and socio-economic status, such as France, Italy, and Germany (Cormier, 2006). Incarceration remains a heavily used disposition in the Canadian justice system,

accounting for the largest proportion (71%) of the \$2.8 billion budget for Canadian correctional services in 2005 (Beattie, 2005).

Historically, it had been thought that the application of punitive sanctions would decrease subsequent antisocial behaviour; specifically, the premise was that removal from the privileges of society along with the resulting stigma of imprisonment reduces a person's likelihood of committing an illegal act. This view of the punishment-crime relationship follows the simple specific deterrence theory (Andenaes, 1968), which holds that the experience of prison in itself acts as deterrent from further criminal behaviour. The simple specific deterrence theory predicts that individuals experiencing a severe sanction are more likely to reduce their criminal activities in the future (Gendreau, Goggin, & Cullen, 1999). While this makes sense intuitively, it also follows simple operant conditioning principles - if an aversive event or outcome is presented shortly after a specific behaviour, it will decrease the probability that the specific behaviour will occur in the future. As applied to criminal behaviour, if an individual faces an aversive event (e.g. prison) immediately after committing an illegal behaviour, they are less likely to repeat the behaviour that triggered the aversive consequence.

An extreme example of this trend is the movement towards using mandatory minimum prison sentences. Especially common in the United States, minimum mandatory sentences are grid-like sentencing prescriptions that attempt to make the 'punishment' fit the crime (Gendreau et al., 1999). The use of standard sentences severely limits judicial discretion and virtually eliminates the weighing of mediating and aggravating circumstances in sentencing. A major justification for the use of mandatory sentences is that they create punishments that are certain and severe, and so are thought to

be more effective punishments than traditional sentences (Gendreau et al., 1999).

Research has shown that there are a number of conditions that must be met for a punishment to be maximally effective: punishing stimuli must be immediate, as intense as possible, predictable, and the delivery of punishment must indicate that reinforcement is not available for the punished response (Matson & DiLorenzo, 1984). While mandatory sentences meet some of these criteria, the fact remains that it is difficult, if not impossible, to implement these principles in a consistent manner in the real world unless offenders live in "some unbelievably efficient Orwellian environment" (Gendreau, 1996, p. 129).

Ultimately, this focus on punitive measures and punishment models has not been successful. The common assumptions that longer, more severe prison sentences are more likely to deter individuals from further crime have been proven wrong. High recidivism rates have shown that imprisonment alone is insufficient in preventing crime (Andrews et al., 1990; Gendreau et al., 1999). Furthermore, evidence now suggests that the length of prison sentence is inversely related to the likelihood of reoffending and that imprisonment of any length (as opposed to community sanctions like probation or house arrest) produces an increase in recidivism (Gendreau et al., 1999). Consequently, many countries have shifted the focus of their judicial system from subscribing exclusively to a punishment model, instead choosing to adopt a more rehabilitative stance. Accordingly, considerable resources have been directed towards implementing various types of remediation programs<sup>1</sup> in hopes of reducing recidivism rates.

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<sup>1</sup> In the forensic literature it is common to use the terms 'rehabilitation' and 'remediation' interchangeably; however, an important distinction exists. Whereas 'rehabilitation' implies restoration to a previous level of functioning, 'remediation' is often used to suggest correction by addressing a preexisting problem. Given the nature of cognitive skills training, as well as many other correctional programs, it seems more appropriate to refer to these types of programming as remediation programming. As such, this term will be used when referring to forensic programming in general.

*The Rise of Remediation Programming in the Correctional System*

The last 20 years or so can be considered a 'renaissance' of offender remediation (Bonta & Cormier, 1999). In the criminal justice context, remediation refers to a broad range of psychosocial programs and services that aim to help the offender address needs related to his offending behaviour and achieve a more productive, law-abiding lifestyle (Wormith et al., 2007). Many national correctional services direct considerable resources to the delivery of psychological treatment programs that are designed to specifically target risk factors for reoffending, with most jurisdictions offering a variety of programs that target specific offenses (e.g., sexual offending), general antisocial attitudes (e.g., programs that aim to change cognitive beliefs supportive of offending behaviour) and areas of functioning that are associated with offending behaviour (e.g., substance abuse; Day, Bryan, Davey, & Casey, 2006). While these programs differ in their level of intensity and focus, their primary objective is to bring about psychological and behavioural change. In this way, prison programming is similar to programming developed for use in non-forensic mental health settings. An additional challenge faced by forensic settings, however, is in the way participants are referred to programming. Offenders are frequently 'encouraged' to attend programming through linkages with security classification or parole decisions; for others participation is legally mandated (Day et al., 2006). Given this situation, for many offenders the 'problem' to be addressed has been identified and defined by others, rather than themselves, leading to offenders beginning treatment with relatively low motivation and insight into the problem. For these reasons, it is critical for prison programming to be as effective as possible, in order to capture whatever motivation an offender brings to programming.

Currently, the dominant approach to offender remediation in Western countries is known as 'what works' (Day et al., 2006). Instead of adopting a 'one size fits all' approach to remediation programming, proponents of 'what works' focus on the characteristics of offender risk, offender need and responsivity to inform the development of effective programming (Andrews, Bonta, & Hoge, 1990). More specifically, offender risk refers to the idea that the intensity of remediation programming should be matched to the risk level of the offender (higher levels of service are best reserved for higher risk cases and low risk cases should receive lower levels of service); offender need refers to the concept of matching the targets of remediation programming to the dynamic risk factors of offenders, where dynamic risk factors are variables that, when changed, are associated with subsequent decreases in the likelihood of criminal conduct; and the principle of responsivity is concerned with the matching of the styles and modes of remediation programming to the learning styles and abilities of offenders. These characteristics guide both administrators and clinicians in the selection of participants, the types of interventions to provide, and the intervention delivery method (Wormith et al., 2007). Accordingly, 'what works' may more appropriately be thought of as 'what works for whom, and in what setting' (Andrews, Bonta et al., 1990). It is now generally accepted that effective programming targets those offenders at higher risk to offend, seeks to change those personal characteristics that are functionally related to the original offense, are relatively intense (over 50 hours), are consistently delivered, use behavioural or cognitive-behavioural methods, and are delivered in ways that match the preferred learning styles of offenders (Day et al., 2006). In summary, 'what works' interventions are well-designed, precisely targeted, and systematically delivered. The extent to which

these principles are followed and treatment integrity is practiced correlates highly with outcomes as measured by recidivism; numerous meta-analyses have shown that 'what works' programming can have small but significant effects and be cost effective in reducing reoffending (Andrews, Zinger et al., 1990; Day et al., 2006; Dowden & Andrews, 2000; Lipsey, Landenberger, & Wilson, 2007; Redondo, Sanchez-Meca, & Garrido, 1999). This body of research firmly supports the adoption of a treatment emphasis in offender remediation, and has lead to the development and implementation of evidence based practices in many correctional services.

The Correctional Service of Canada (CSC) is an example of a federal correctional system that has taken a leadership role in the development and implementation of programs for rehabilitating offenders that follow the 'what works' doctrine (Bonta & Cormier, 1999; Paschall & Fishbein, 2002). Most of their efforts have concentrated on intensive cognitive behavioural and skill-based therapies, with an emphasis on violence prevention (Paschall & Fishbein, 2002). One of the most well developed and favorably reported of these cognitive-behavioural treatment programs is called Reasoning and Rehabilitation (R & R; Ross, Fabiano, & Ewles, 1988).

R & R is based on the premise that antisocial behaviour is a consequence of an offender's inability to reach his or her goals in a prosocial way (Blud & Travers, 2001); offenders initiate and maintain an antisocial lifestyle because they are "unaware of how their thinking is propelling them into difficulties, and ... are unable to extricate themselves since they lack the skills to do so" (Porporino & Fabiano, 2000, p. 13).

Consequently, antisocial behaviour cannot be understood by analyzing antecedents to that behaviour, instead antisocial behaviour must be understood as resulting from an

antisocial self-concept that the individual has developed over a lifetime (Blud & Travers, 2001). From this perspective, it is more effective to direct intervention efforts at the level of basic skill deficits and teach offenders sociocognitive skills that will help promote prosocial behaviour, instead of focusing on specific antisocial attitudes, behaviours or events (common in 'relapse prevention' programs; Blud & Travers, 2001). In order to focus on changing the process of thinking, the R & R program targets deficits in interpersonal problem solving, moral reasoning (e.g., understanding the values which govern behaviour), social skills, perspective taking, critical reasoning, self-control (e.g., thinking before acting), and assertiveness (Ross et al., 1988). It is hoped that by targeting these sociocognitive deficits, offenders will increase both the motivation and ability to make prosocial behavioural choices. The R & R program is currently offered in all Canadian federal correctional institutions, and it has also been implemented in a variety of settings (e.g., adult prisons, youth detention centers, and probation offices) and in countries such as the United States, the United Kingdom, Spain and New Zealand (Blud & Travers, 2001; Friendship, Blud, Erikson, Travers, & Thornton, 2003). While an immediate increase in pro-social behaviour is desired, ultimately success is measured by decreasing the rates of offender recidivism following completion of treatment and release into the community (Friendship et al., 2003).

#### *Does Remediation Programming Work?*

Evaluations of this program and similar cognitive-behavioural approaches have been primarily positive, with offenders showing reductions in institutional violence and increases in impulse control (Paschall & Fishbein, 2002). More importantly, both Canadian and American research has provided encouraging evidence supporting the

relationship between remediation programming and reductions in recidivism, with multiple studies indicating that forensic programs routinely reduce recidivism by rates 10% or higher (McGuire, 2002). In one of the largest evaluation studies of over 4,000 Canadian offenders, it was found that completion of a cognitive skills training program reduced overall recidivism by 11% over a one-year period following release (Robinson, 1995). While these results represent a significant reduction in reoffending behavior, even greater decreases in recidivism were reported when specific offender groups were examined. Most notably, when looking at program effectiveness for offenders convicted of sexual offenses, or offenders classified as medium risk offenders, recidivism reductions in the range of 35-58% were reported, suggesting that offenders who completed remediation programming were as much as 58% less likely to reoffend than untreated comparables. Numerous other studies have found similar results, albeit with smaller sample sizes (Anderson, 2002; Bush, 1995; Ross et al, 1988; Porporino, Fabiano, & Robinson, 1990; Porporino & Robinson, 1995). Taken together, these results indicate that correctional programming can reduce offending behaviour in prisoners and can promote prosocial behavioural change in offenders.

Internationally, research investigating the association between remediation programming and reductions in recidivism has produced inconsistent results (Anstiss, 2003). Whereas forensic remediation programs conducted in North America have typically achieved reductions in recidivism of around 16%, in implementing similar programs, international settings only expect reductions in recidivism of around 4% (Merrington & Stanley, 2000). While some studies have shown robust reductions in recidivism similar to what has been found in North America (e.g., Friendship et al., 2003;



Polaschek, Wilson, Townsend, & Daly, 2005), others have shown modest or even non-existent effects on recidivism. For example, a review by Merrington and Stanley (2000) looked at four remediation programs used with offenders in the United Kingdom. While the programs evaluated were similar in scope, and in one case identical, to programs used in North American penal systems, the results were not as promising as would be hoped. Of the four programs, two were shown to have a modest impact in reducing recidivism rates (6% or less), while the remaining two programs had no impact on recidivism. Moreover, the wide-spread implementation of these types of remediation programs in the British correctional service has been described as a 'leap of faith' seeing as there has yet to be sufficient empirical evidence to support the suitability of these programs across a wide diversity of offender who have committed a wide range of offenses (Blud, Travers, Nugent & Thornton, 2003). Consistent with these findings, others point to remediation programs that have failed to reduce recidivism in other international settings (Anstiss, 2003; Guerra & Slaby, 1990; Lipsey et al., 2007; Robinson, 1995).

#### *Explaining the Variability in Remediation Programming Outcomes*

While there is a substantial body of evidence in support of program efficacy in reducing criminal behaviour and promoting positive life change, it still remains that these programs are effective for some individuals but not others, and this variability is problematic. Some researchers contend that the larger reductions in recidivism associated with some programs can be attributed to regional and/or institutional factors, and that small sample sizes artificially inflate positive outcomes (Gendreau et al., 1999). Others have criticized the nature of remediation programming, questioning whether the largely cognitive-behavioural approach to remediation programs in correctional settings is

appropriate (Merrington & Stanley, 2000; Wormith et al., 2007), and arguing that remediation programming is too narrow in focus (Matthews & Pitts, 1998). Researchers have dedicated considerable effort to investigate possible factors that could account for recidivism variability; factors such as substance abuse (Stein & Graham, 2005), psychopathy (Serin, 1996), general attitudes towards consequences (Nagin & Pogarsky, 2004), and motivational intensity (Robinson, 1995) have been implicated. One factor that has begun to gather research interest is the offender's level of executive cognitive functioning (ECF).

### *Executive Cognitive Functioning Defined*

A variety of ECF definitions have been proposed in the psychological literature by theorists trying to capture the conceptual meaning of this complex construct; apart from minor variations, they are generally in keeping with one another (Giancola, Mezzich, & Tarter, 1998). For the purposes of this article, ECF is defined as a higher order cognitive construct that is involved in the planning, initiation, and self-regulation of goal directed behaviour (Giancola et al., 1998; Luria, 1980; Pennington & Ozonoff, 1996). Considered an 'umbrella term', ECF comprises a wide range of cognitive processes and behavioural competencies. Specific skills include cognitive flexibility (also referred to as set-shifting and set maintenance), strategy formation, attention, strategic goal planning, working memory, response monitoring, and inhibition (Damasio, 1995; Mullin & Simpson, 2007; Pennington & Ozonoff, 1996; Welsh & Pennington, 1988). Taking a more functional approach, it is evident that the ability to correctly evaluate a situation, determine an appropriate plan of action to cope with that situation, and then carry out that plan while monitoring the results to ensure the desired action is achieved

(or make corrections as necessary), is heavily dependent on ECF (Giancola, 2004).

Recently, ECF has been divided into 'hot' and 'cold' components: 'hot' components are thought to reflect executive functions involving more emotion, belief or desire, such as the experience of reward and punishment, whereas 'cold' components are thought to involve ECF processes that tend to not involve much emotional arousal and are relatively mechanistic or logical (Chan, Shum, Touloupoulou, & Chen, 2008).

The functions of ECF have been attributed primarily to the prefrontal cortex of the brain (Fassbender et al., 2004; Jurado & Rosselli, 2007; Paschall & Fishbein, 2002). The prefrontal cortex can be subdivided into distinct areas that have reciprocal connectivity with each other as well as with posterior and subcortical brain regions. Two of these areas that are most important to ECF are the orbitofrontal (which includes the ventromedial and ventrolateral prefrontal cortex) and dorsolateral prefrontal regions (MacPherson, Phillips, & Della Sala, 2002). The dorsolateral prefrontal cortex is thought to mediate the 'cold' components of ECF (e.g., mechanistic planning, problem-solving, cognitive flexibility), whereas the orbitofrontal prefrontal cortex is thought to mediate the 'hot' components of ECF (e.g., regulation of behaviour and decision-making involving emotional interpretation; Chan et al, 2008). While these areas of the prefrontal cortex are closely interconnected with each other, they are also connected to distinct parts of the brain. In particular, the dorsolateral neurons show connectivity with the regions associated with motor control, performance monitoring, and sensory processing, while the orbitofrontal neurons show connectivity with regions associated with emotional processing, memory, and sensory processing (Wood, 2003). Accordingly, there is a growing appreciation for the role of a variety of regions of the frontal lobe, as well as a

broad cerebral network, in mediating ECF abilities (Stuss & Alexander, 2000). For example, the prefrontal cortex has indirect and direct connections with the anterior cingulate, the striatum, the thalamus, and the cerebellum; these areas of the brain are also involved, at least in part, in governing ECF abilities such as attention, working memory, planning, set shifting and the regulation of goal directed behaviour (Giancola et al., 1998; Jurado & Rosselli, 2007; Monchi, Petrides, Strafella, Worsley, & Doyon, 2006).

Given the importance of ECF in both routine, everyday behaviour and novel, complex behaviour, it is not surprising that deficits in ECF are associated with numerous harmful consequences. Much of what we know about the consequences of impaired ECF is derived from neuropsychological research on frontal lobe damage resulting from either lesion or traumatic brain injury (for example, Bechara, Damasio, Tranel, & Anderson, 1998; Cohen et al., 1997; Koski & Petrides, 2001), although damage to ECF abilities can occur as a result of lack of stimulation, stroke, excessive alcohol or drug use, dementia, and schizophrenia, among other causes. Damage to the frontal systems often results in a multitude of consequences that can present differently across individuals (for a review, see Hawkins & Trobst, 2000). As ECF generally refers to cognitive processes that allow for future, goal-oriented behaviours it is not surprising that individuals with ECF deficits often exhibit difficulties in the general areas of planning and decision making, and experience difficulty in becoming self-sufficient (Fuster, 1997; Goel, Grafman, Tajik, Gana, & Danto, 1997; Masterman & Cummings, 1997). Equally important is the role that ECF plays in social behaviour and emotion regulation, especially in regards to conforming to societal expectations (Pennington & Ozonoff, 1996; Wood, 2003).

*Executive Cognitive Functioning and Antisocial Behaviour*

A wealth of research supports the relationship between the expression of antisocial behaviour and associated behavioural deregulation, and deficits in ECF (Hawkins & Trobst, 2000; Kandel & Freed, 1989; Morgan & Lilienfeld, 2000; Paschall & Fishbein, 2002). Historically, damage to the prefrontal cortex was thought to result in what has been called frontal lobe syndrome, where the inability to control anger results in aggressive and violent behaviour (Hawkins & Trobst, 2000). Blumer and Denson (1975) coined the term pseudo-psychopathic personality to describe the tendencies towards disinhibition, extreme self-indulgence, boisterousness, and inappropriate sexual humour common in those with damage to the prefrontal cortex. Although problems of disinhibition are implicated, there are many other ways that frontal lobe damage can contribute to aggression. For example, deficits in planning (leading to inappropriate or reckless behaviours), cognitive flexibility (leading to rigid behaviour patterns and difficulty modifying behaviour), and interpersonal relations (including a lack of awareness of one's effect on others, or their emotional state) can all heighten the risk for aggressive or antisocial behaviour.

Deficits in ECF have been associated with increased aggression in community populations of male youth (Camp, 1977; Moffitt, 1993; Moffitt, Lynam, & Silva, 1994; Seguin, Pihl, Tremblay, Boulerice, & Harden, 1995), adult males (Giancola & Zeichner, 1994; Lau, Pihl, & Peterson, 1995), female youth (Olson & Hoza, 1993), and adult females (Villemarette-Pittman, Stanford, & Greve, 2002). When focusing on forensic populations, these findings become even more robust. For instance, populations of male and female incarcerated young offenders (Olvera, Semrud-Clikeman, Pliszka, &

O'Donnell, 2005; Moffitt, 1990), as well as adolescent girls with Conduct Disorder (Giancola et al., 1998) and male and female children with Conduct Disorder (Toupin, Dery, Pauze, Mercier, & Fortin, 2000) have all demonstrated inferior ECF performance. One of the strongest pieces of evidence for the relationship between ECF deficits and antisocial behaviour comes from Morgan and Lilienfeld's (2000) large-scale meta-analysis of the literature. This methodologically rigorous meta-analysis of 39 studies of adult offender and juvenile delinquent populations yielded over 4,500 participants and included only neuropsychological indices of ECF that had been theoretically derived and well validated empirically, and stringently operationally defined both executive function and antisocial behaviour. Accordingly, it can be concluded that the included studies legitimately reflect the relationship between ECF and antisocial behaviour in offender/delinquent populations. The results indicated that the antisocial groups performed .62 standard deviations worse on tests of ECF than comparison groups, signifying a 'medium' to 'large' effect size of ECF on antisocial behaviour, and leading the authors to conclude that "there is a robust and statistically significant relation between antisocial behaviour and executive function deficits" (Morgan & Lilienfeld, 2000, p. 128).

Fewer studies have established the relationship between ECF deficits and antisocial behaviour in adult offenders, but the available research provides similar findings. For example, Cohen and colleagues (1999) found that when compared to non-violent males, men with a history of domestic assaults performed significantly worse on multiple measures of ECF intended to assess strategy formation, working memory and attention. Subsequently, these results were replicated in another group of males with a

history of aggressive and violent behaviour, with participants showing deficits in cognitive flexibility, attention and impulsivity (Cohen et al., 2003). Consistent with these results, Blake and colleagues (1995) have found similar ECF deficits in males convicted of murder, while Dolan and Anderson (2002) found ECF deficits in aggressive male offenders. A study by Hoaken, Allaby and Earle (2007) provides further support for the relationship between offenders, impaired ECF and antisocial behaviour, finding that both violent and non-violent offenders performed poorer than community controls on measures of executive function intended to assess working memory, associative learning, strategy formation, and response monitoring. Unique to this study, offenders were also examined on a task of facial-affect recognition in order to investigate the possibility that impairments in executive function may interfere with other cognitive and/or perceptual abilities. While the interpretation of facial expressions of emotion is not exclusively prefrontally mediated, compelling neuroimaging evidence suggests that there is a significant role for the prefrontal cortex in mediating this ability (Phan, Wager, Taylor, & Liberzon, 2002). Looking specifically at aggression, deficits in the ability to identify facial expressions of emotion can result in a failure to correctly interpret ambiguous social situations and the generation of inappropriate social responses such as aggression; the poorly regulated behaviour seen in offenders may be as a result of both impairments in the coding and interpretation of simplistic social cues and deficient ECF abilities (Hoaken et al., 2007). Although there were no significant differences between non-violent offenders and community controls, violent offenders showed an impaired ability to interpret facial expressions of emotion. These deficits may be indicative of impairments in the encoding and interpretation of social stimuli, which can be seen as being

functionally related to executive functions, particularly the 'hot' components (e.g., decision-making involving emotional interpretation). Studies using functional and structural imaging have added further support to the relationship between aggressive and antisocial behaviour and ECF deficits, consistently showing that individuals who have histories of aggression show abnormalities in frontal lobe structures (Mills & Raine, 1994; Raine, Lencz, Bihrlé, LaCasse, & Colletti, 2000; Raine, Buchsbaum, & LaCasse, 1997; Soderstrom, Tullberg, Wikkelso, Ekholm, & Forsman, 2000).

Looking at the body of research, it seems clear that offenders in general have poor ECF as compared to community samples. A reader unfamiliar with the construct may assume that this relationship is simply a result of a larger association, and that the dysfunctions associated with ECF deficits are due to an overall lower level of intelligence. In support of this assertion it has been shown that compared to the general Canadian adult population, offenders have lower levels of educational achievement (Beattie, 2005). On closer examination, however, the association between education, and subsequently intelligence, and ECF may be less straightforward than at first glance. Some researchers argue that the ECF deficits seen in offenders are related to styles of thinking and attitudes, not educational attainment or general level of intelligence (Friendship et al., 2003). Substantiating this, Duncan and colleagues (1995) have shown that the ECF deficits related to planning and problem solving seen in individuals with frontal lobe lesions are not related to pre-morbid level of intelligence, which is typically maintained after the lesion, while Seguin and colleagues (2004) demonstrated similar findings in aggressive youths. Additionally, Morgan and Lilienfeld's (2000) meta-analysis examining the relation between antisocial behaviour and ECF found no effect for



intelligence, further supporting the conclusion that ECF is not highly correlated with general intelligence. To address the paradox that patients with damage to the prefrontal cortex have impaired 'planning,' 'problem-solving,' etc., but preserved 'intelligence', it has been suggested that the frontal lobes may be particularly important for fluid intelligence, which can be thought of as the ability to reason abstractly and solve problems, but it less important in crystallized intelligence, which can be thought of as the ability to use past experiences and previously accumulated knowledge (Pennington & Ozonoff, 1996). Many psychometric measures of intelligence emphasize crystallized IQ (e.g., many subtests in the Wechler series of intelligence measures tap accumulated information), and as a result they are insensitive to the effects of ECF deficits (Pennington & Ozonoff, 1996). Consequently, it is possible for an individual to perform in the average range on standardized intelligence testing and yet have significant weaknesses in their executive abilities, although it would be rare for a person with extremely low intelligence to have strong executive functioning abilities. It may be more realistic to speak of intelligence and ECF as two distinct, yet related abilities that share some influence over each other (Seguin, Boulerice, Harden, Tremblay, & Pihl, 1999).

As discussed previously, many authors have explored the association between ECF deficits and aggressive or violent behaviour (Giancola et al., 1998; Guerra & Slaby, 1990; Hoaken, Shaughnessy, & Pihl, 2003). When the results of these studies are examined for real-world meaning, several conclusions are reached: offenders make poor choices, are impulsive, face difficulties in modifying their behavioral responses, and have difficulty relating to others in a prosocial manner. In sum, offenders have difficulty following the rules and customs of society. Given that deficits in ECF appear to be

associated with an increase in antisocial behaviour, intuitively we would expect to see an association between the degree of ECF deficits and the degree (or frequency) of offending. In line with this hypothesis, Ross and colleagues (2008) found that when compared to first-time offenders, repeat offenders performed significantly worse on multiple measures of ECF. Specifically, repeat offenders showed greater deficits than first-time offenders in many of the cognitive processes comprising ECF: response monitoring, inhibition, strategy formation, working memory, and problem-solving abilities.

#### *Executive Cognitive Functioning as a Possible Direction for Future Remediation Programming*

Due to the immense costs associated with offending, costs which increase exponentially with repeat offending, it is important to direct our remediation efforts so they have the greatest effect possible. Thus far, this has meant targeting behavioural self-regulation, social skills, problem solving skills, and judgment (Blud & Travers, 2001). This focus by correctional systems may be explained by the fact that difficulties in social behaviour are more easily identifiable than less obvious deficiencies in executive functions. Additionally, designing interventions that improve basic deficits in sociocognitive skills are easier to both implement and evaluate. However, without remediation, deficits in ECF may actually interfere with the offender's ability to benefit from correctional programming, especially given the dominant cognitive-behavioural approaches where the focus is on learning and practicing new skills (De la Higuera Romero, 2003). For example, it has been suggested that one reason remediation programming has failed to improve recidivism rates is because of the emphasis on *what*

offenders think as opposed to *how* they think (Serin & Kuriychuk, 1994). As it has been shown that offenders who persistently reoffend process information differently from others due to ECF deficits (Ross, Neil, & Hoaken, 2008), for remediation programming to be effective with this population executive function abilities must be addressed prior to targeting the sociocognitive skills of empathy, antisocial attitudes and moral reasoning (Serin & Kuriychuk, 1994). Although much of the research on correctional-based remediation programming acknowledges the importance of executive control, it still remains that the accumulating research has yet to inform the development and implementation of remediation programming (Bonta & Cormier, 1999).

This knowledge gap has begun to be addressed by research with non-forensic populations, however. Researchers working with individuals with traumatic brain injury and schizophrenia have begun to develop empirically supported interventions to improve the ECF deficits experienced by these populations. These rehabilitation programs offer promising results, with reductions observed in the level of aggression, violent behaviour and impulsivity in individuals with traumatic brain injuries (Amos, 2002; Mullin & Simpson, 2007), and improvements in the ECF of individuals with schizophrenia (Penades et al, 2003; Wykes, Reeder, Corner, Williams, & Everitt, 1999). As a result, it is now being suggested that the cognitive and behavioural 'neuropsychiatric' strategies used for individuals with traumatic brain injuries or schizophrenia may have protective or therapeutic effects on the behavioural deregulation seen in individuals with ECF deficits (Paschall & Fishbein, 2002). If ECF deficits in offenders are associated with antisocial behaviour and reoffending, it makes sense to adapt our current remediation programming to focus on improving these abilities in offenders.

At this point it is important to discuss how modifying current remediation programming to include a component addressing ECF deficits would fit into the 'what works' doctrine of programming. As discussed earlier, the principles of offender risk, offender need and responsivity have been found to be important to adhere to in terms of reducing recidivism (Andrews, Bonta et al., 1990; Wormith et al., 2007). A number of studies have explored the relative contributions of the 'what works' principles to the reduction of recidivism, finding significant effects for all three principles (Andrews, Zinger et al., 1990). For example, a review by Andrews and colleagues (2006) summarized the effectiveness of 'what works' by examining the correlations between adherence to these principles with the effect sizes from 42 meta-analytic reviews of the 'what works' literature. For all three principles, the correlations were considered 'large', with correlations of .54 (offender risk), .58 (offender need) to .60 (responsivity). Although all three principles have been found to be equally important, much of the forensic literature has focused on adherence to the offender risk principle as a critical factor in reducing recidivism, with the identification of offender needs a close second (Hollin & Palmer, 2009). As a result, responsivity remains the least explored of the 'what works' principles. It is thought that the identification of a relationship between recidivism and ECF deficits would have the potential to enhance the effectiveness of this principle. As responsivity is concerned with the match between the learning styles and abilities of offenders and the remediation programs they attend, if offenders with ECF deficits are participating in remediation programming that fails to take into account their impairments, the programming is not being responsive to their needs. According to the 'what works' principles, modifying current remediation programming to take into

account offenders' ECF deficits would result in a better match between the programming and the learning styles and abilities of the offenders, which we would expect to ultimately lead to an increase in the effectiveness of the programming and consequently a reduction in recidivism.

Looking at the current landscape of forensic remediation programming, it is clear that we are on the threshold of several important changes. Most remediation programs adopt cognitive behavioural methods, and use a skills-focused or problem-solving approach to offender change (Day et al., 2006). The success rates of these interventions, while significant, still leaves room for improvement. As such, it has been suggested that it is important to evaluate the role of ECF in differential responses to remediation programming (Paschal & Fishbein, 2002). Integrity of ECF may play a role in not only risk for aggressive and violent behaviour but also in differential responses to interventions. It may be the case that remediation programs are attempting to give skills to individuals who do not have the necessary ECF for participation to be beneficial. While it is hoped that after sufficient exposure to forensic remediation programs offenders may become more able to respond to environmental demands in a prosocial manner, meaning that they are able to understand others' perspectives, appropriately interpret social interactions, demonstrate self-control and ultimately select or construct the appropriate behavioural response, this may be possible only if the offender also has sufficient ECF to provide a foundation for the development of these abilities (Hoaken et al., 2007).

The causes of antisocial behaviour are multifaceted and ECF deficits may be a factor in only a small percentage of those who reoffend. However, given the tremendous

societal and personal consequences of crime, it is still important to investigate whether there are aspects of brain function that are relevant to antisocial behaviour (Broomhall, 2005). To help address these issues, as well as to determine whether ECF may be a promising avenue for forensic remediation programming to follow, the current study attempted to determine whether or not there is a relationship between ECF and recidivism.

### *Study Objectives*

The specific research goal was to conduct a longitudinal, multi-site study so as to better understand the relationship between offenders' ECF and their reoffending behaviour once they have been released from a correctional institution, as well as the relationship between offenders' ECF and their behaviour leading up to release; to achieve this there were three objectives.

The first objective was to investigate the extent to which offenders released for 'good' correctional institution behaviour, labeled 'institutional conformists', and offenders released after 'poor' correctional institution behaviour, labeled 'institutional non-conformists', differed from each other on various ECF abilities. Offenders released for 'good' behaviour are those released on day parole or full parole. This means that they have successfully applied for parole from the Canadian National Parole Board (NPB), and are serving the remaining portion of their sentence in the community while participating in remediation activities under the supervision of the NPB; offenders receiving day parole are required to return to the correctional institution at night, while offenders receiving full parole are in the community full-time (Beattie, 2005). As a result of their successful application for community release, it is presumed that they have

learned to follow the institutional rules, interact with others in a prosocial manner and attend programs productively. Alternatively, offenders released after 'poor' behavior are those who are released on statutory release or warrant expiry. In Canada, by law, most federal inmates are automatically released after serving two-thirds of their sentence if they have not already been released on day or full parole. This is known as statutory release; once released to the community they participate in remediation activities while under the supervision of the NPB. Offenders may be denied statutory release if the CSC believes they are at an elevated risk to commit a serious offense (i.e. murder or a serious drug offense). If this occurs, the offender is imprisoned for their entire sentence, until the warrant expiry date is met. An offender released due to warrant expiry is no longer under the jurisdiction of the CSC and so has no legal requirement to participate in community remediation activities. Both statutory release and warrant expiry are considered negative outcomes, and reflect disciplinary problems, refusal to attend programming (or minimal participation), and other behavioural issues. Given the very different behavioural presentations between these two groups of offenders, it was expected that institutional non-conformists would show worse performance on measures of ECF than institutional conformists, as their greater ECF deficits would presumably make it difficult to learn the rules of institutional conduct, choose appropriate ways of responding and function well in the forensic setting in general.

The second objective was to investigate whether offenders who had been able to avoid returning to a correctional institution upon release, labeled 'non-recidivists', differed in ECF abilities from offenders who had been returned to a correctional institution, labeled 'recidivists'. It was hypothesized that recidivists would show worse

performance on measures of ECF than non-recidivists, in line with research that has associated increased offending behaviour to decreased ECF performance.

Finally, the third objective was to investigate whether there were difference in ECF abilities between offenders who returned to a correctional institution after a short period of time (less than 132 days), labeled 'early' recidivists, and those offenders who returned to a correctional institution after a longer period of time (more than 446 days), labeled 'late' recidivists. No hypothesis was made for this objective as it was exploratory in nature; while it is possible that a linear relationship between the degree of ECF deficits and likelihood of recidivism exists, it may be that the likelihood of recidivism is the same once a certain 'threshold' of ECF dysfunction is met.

### Method

#### *Participants*

A total of 95 male federal offenders were examined in the current study. The data used for this investigation represented a subset of data gathered for a larger study that was designed to investigate the ECF abilities of adult male federal offenders as compared to adult male community controls (Ross et al., 2008). Data were originally gathered from two medium security institutions of the Correctional Service of Canada (Springhill Institution in Springhill, Nova Scotia and Fenbrook Institution in Gravenhurst, Ontario). Both of these institutions housed offenders serving sentences of two years or more and thus the sample is thought to be representative of a typical federal offender population, with both violent and non-violent offenders. Due to the structure of the Canadian correctional system, offenders sentenced to prison terms of less than two years serve their sentences in provincial institutions while offenders sentenced to two years or more serve



their sentences in federal institutions. Accordingly, the sample was composed of offenders who have either committed a serious violent offence, multiple serious offences, or have lengthy criminal histories in addition to the index offense(s), as opposed to minor breaches of Canadian law. While the majority of traditional demographic statistics do not apply to an offender population (e.g., socioeconomic status), it was found that the offenders were an average age of 34.81 years (range = 19–61;  $SD = 9.85$ ), had on average 11.01 years of education (range = 5–17;  $SD = 2.57$ ), and were serving an average sentence of 49.8 months in correctional custody (range 0.47–345.07;  $SD = 65.79$ ).

Offender data were collected by two researchers who were allowed to access the offender population by the Psychology departments of each institution. Once on the offender units, the following recruitment protocol was followed: offenders were mailed letters of invitation, posters advertising the study were positioned in communal areas, researchers approached offenders in person, and an outdoor recruitment event sponsored by a peer counselling committee was held. If possible, appointments were arranged in advance and posted on a central communication board. Otherwise, researchers attending the unit would inquire about interested offenders.

The majority of offenders were eligible to participate in the study, with the following exceptions. Offenders were unable to participate if they denied committing the offence they had been charged with, were undergoing an appeal for their conviction, were considered too dangerous to participate by the institution's head psychologist, or were considered to be actively engaged in institutional misconduct. At the time of assessment two additional exclusion criteria were considered, offenders were required to speak fluent English and have normal or corrected to normal vision.

Once offenders were cleared to participate, they were informed of the testing procedure in more detail, as well as the voluntary nature of the study. Prior to informed consent being signed, it was stressed to the offender that the decision to participate and the results of testing would not be included in their correctional record and would have no impact on any ensuing correctional decisions regarding placement, release opportunities, etc.

As all measures were administered via computer laptop, offenders were provided with a short tutorial if they indicated they were unfamiliar or uncomfortable with using a laptop computer. Once the offender was comfortable with the technology, the testing procedure began. All offenders answered a brief demographic form, before moving onto one of five measures of ECF (the order of presentation was randomly assigned). Although the testing process was restricted by institutional scheduling restrictions, the majority of offenders completed the testing process in one 2-3 hour session.

### *Measures*

*Primary executive cognitive functioning (ECF) measures.* As ECF is a broad construct, multiple measures are needed to assess the relevant cognitive abilities thought to constitute ECF. Multiple models of ECF have been proposed, and for each proposed model there are tests of the cognitive components theorized to contribute to ECF (for a review, see Chan et al., 2008). While the measures selected for use in the current study do not follow a singular theory of ECF, they are all theory based, empirically derived, psychometrically sound and are considered well validated measures of assessing executive functions (Morgan & Lilienfeld, 2000; Paschall & Fishbein, 2002; Pennington & Ozonoff, 1996).

*Conditioned Nonspatial-Association (CNA) test.* The CNA is a test designed to measure strategy formulation, response monitoring of recently learned information, learning of contingent associations and active monitoring in working memory (Petrides, 1990). In this task, offenders were presented with a coloured rectangle and 2x3 array of six abstract images, each of which was randomly assigned to a specific coloured rectangle (once assigned, the association between colour and abstract images remained constant throughout the task). Offenders were then required to learn through trial-and-error which of the six abstract images was associated with which colour. Once the offender successfully identified the correct association between colour and abstract image, the abstract images were reordered and another colour was presented. This process continued until 18 consecutive correct trials were completed or until 180 trials were administered. Variables of interest include the total number of incorrect trials, total number of errors committed, and number of trials required to complete the task. Previous research has shown that the dorsolateral prefrontal cortex is involved in the completion of the CNA task (Petrides, Alivisatos, Evans, & Meyer, 1993). Especially relevant to the current study, previous research has shown that that impaired performance on this task is related to antisocial behaviour, specifically increased aggression (Giancola, 1995; Seguin et al., 1999; Seguin et al., 1995).

*Somatic Marker Sensitivity (SMS) test.* Also known as the 'Iowa Gambling Task', the SMS test is thought to assess the cognitive capacities of strategy formation and response monitoring (Paschall & Fishbein, 2002). The SMS test is considered to be a valid measure of ECF, and is thought to stimulate real life decision-making processes (Broomhall, 2005). The task involves a card game where offenders are to select cards

from four 'decks' of cards presented on the computer screen. After each selection, the computer gives a reward, punishment, or combination of the two (e.g., "Win 50", "Lose 100", or "Win 200, Lose 200"). Given 2000 points to begin, the offenders are told the purpose of the game is to maximize the number of points they can accumulate, and that they are free to switch decks whenever they choose, as often as they choose. The task was over once the offender had drawn 100 cards.

Two of the four decks yield high instant gain but larger future loss ('high risk'), while the remaining two decks yield lower instant gain but a smaller future loss ('low risk'). While the ideal strategy was to select cards from the low risk deck and ignore those decks offering high instant gain but larger future loss, it was difficult to determine this strategy as the decks delivered points in a complex schedule of punishment and reinforcement pre-programmed into the computer program. In the SMS test, the dependent variables of interest is the total number of points after the task is completed.

The SMS test was specifically designed to assess decision making following damage to the ventromedial prefrontal cortex, and as such, numerous studies have shown that individuals with deficits in this area are unresponsive to the possible consequences of continuing to draw from the high risk decks (i.e. demonstrate difficulty in shifting their selections to the more advantageous low risk deck), demonstrate difficulties in forming strategies that minimize immediate rewards but maximizes future gains (i.e. delaying gratification), and have difficulty monitoring previous responses (Bechara et al., 1994; Bechara et al., 1998; Damasio, 1998). Additionally, research has also shown an association between poor performance on the SMS and antisocial behaviour (e.g.,

reactive and instrumental aggression, Broomhall, 2005; and psychopathy, Mitchell, Colledge, Leonard, & Blain, 2002).

*Wisconsin Card Sorting Test (WCST)*. The WCST assesses strategy formation, working memory, cognitive flexibility, and response monitoring and is considered a prototypical ECF task used frequently in neuropsychology (Harris, 1990; Heaton, Chelune, Talley, Kay, & Curtiss, 1993; Pennington & Ozonoff, 1996). The WCST required offenders to sort a deck of patterned 'cards' on the computer screen into four piles (represented by four sample 'cards' on the computer screen) according to three categories (colour, shape and number). Following each sort, the computer program provided audio and visual feedback to the offender about whether the sort was correct ("Right" or "Wrong"), but provided no additional information. Offenders were not informed of the sorting principle prior to beginning the task, and so had to rely on the feedback given in order to determine the sorting criterion. This feedback was then used by the offender to determine the placement of subsequent cards. Once 10 consecutive cards had been categorized correctly, the computer changed the sorting criterion without informing the offender. All matches made according to the previous sorting criterion received negative feedback, and offenders were expected to shift to a new sorting criterion. The task ended once the offender had correctly sorted 10 cards in each of 3 categories two times, or two decks of 64 cards had been sorted.

In the current study, performance on this task was indicated by three scores: number of trials to complete the first category, which indicated the ability to form a working strategy; total number of perseverative (or persisting) errors, which were thought to indicate either a failure to inhibit a previously rewarded response or a failure to shift to

a new sorting criterion according to relevant feedback; and failure to maintain set (which occurred when the offender abandoned the correct strategy after making 5 correct sorts), which indicated a failure of working memory or a failure to monitor the response made according to relevant feedback (Heaton et al., 1993). The WCST has been shown to be sensitive to prefrontal lobe damage in populations such as individuals with focal and diffuse brain damage (Robinson, Heaton, Lehman, & Stilson, 1980), and individuals with schizophrenia (Van der Does & Van den Bosch, 1992). Additionally, research has shown a relationship between poor performance on the WCST and aggression in non-offender populations (Hoaken, Giancola, & Pihl, 1998; Giancola, 2004)

*Inhibition/impulsivity measures.* While there is some debate as to the role of impulsivity in ECF, the majority of researchers have concluded that impulsivity, while often neglected in studies of ECF, is an important component of executive control (Fishbein et al., 2005; Pashall & Fishbein, 2000; Welsh & Pennington, 1988). In support of this, factor analytic studies in both normal and clinical population, correlational studies of impulsivity and other tasks commonly used to measure ECF, and results from functional brain imaging of the prefrontal cortex have all confirmed that inhibition is an integral component of ECF (Fassbender et al., 2004; Giancola, 2004). For the current study, two behavioural measures of impulsivity were selected, the Go/No-Go task and the Go-Stop task. Just as the abovementioned primary ECF measures were selected because they have been shown to address a wide variety of cognitive abilities agreed to reflect the construct of ECF (e.g., strategy formation, response monitoring, set-shifting), the selected measures of impulsivity have been shown to be associated with the construct of ECF (Fishbein et al., 2005; Giancola, 2004). Although self-report impulsivity questionnaires

are available (e.g., Eysenck's impulsivity questionnaire; Eysenck & Eysenck, 1977), behavioural measures avoid potential sources of biases like self-awareness and demand characteristics that are common with this type of measurement instrument (Helmers, Young, & Pihl, 1995; Parker & Bagby, 1997).

*Go/No-Go task.* The Go/No-Go task is thought to assess passive avoidance, or the ability to withhold a response previously associated with punishment, and is generally thought of as a measure of behavioural disinhibition. While there are many adaptations of the Go/No-Go task the fundamentals of the task remain the same, the version used in the current study was adapted from research by Patterson and colleagues (Patterson, Kosson, and Newman, 1987).

The Go/No-Go task consists of two phases, a learning phase and a testing phase. During the learning phase, offenders were presented with eight two-digit numbers, four numbers were consistently paired with positive visual feedback ("Good") and four numbers were consistently paired with negative visual feedback ("Bad"). Offenders learned the association between number and visual feedback through a trial-and-error process; numbers were randomly assigned to positive or negative feedback pairings and there were no features of the numbers (e.g., odd or even, numbers, number greater or less than 100, etc.) that made them more or less likely to be associated with a particular category of feedback. During the testing phase, the same eight numbers were displayed on the computer screen one at a time, in random order, for 80 trials. Offenders were instructed to respond only to numbers that had been paired with positive feedback during the learning phase and to withhold (inhibit) responses to numbers that had previously been paired with punishment during the learning phase. Numbers were displayed on the

screen for two seconds or until the offender responded; the interstimulus interval was one second. Points were awarded throughout the task and displayed on the screen after each response: offenders received 10 points for a correct response and lost 10 points for an incorrect response. In this study there were two variables of interest: errors of commission (failure to inhibit responses to negative stimuli), and errors of omission (failure to respond to positive stimuli).

The Go/No-Go task has been identified as one of the most credible behavioural measure of impulsivity (Helmers et al., 1995; Paschall & Fishbein, 2002), and it has been used extensively in empirical studies (Brown, Fenwick, & Howard, 1989; Patterson et al., 1987). Of importance to the current study, there is evidence that impaired performance on the Go/No-Go task is related to antisocial behaviour (e.g., aggression and drug use; Paschall & Fishbein, 2002).

*Go/Stop task.* The Go/Stop task asked offenders to inhibit a response in reaction to a subtle cue. Specifically, the offender was trained to respond to stimuli ('go signals') in a specific manner, and then was expected to inhibit the response when 'stop signals' intermittently informed him to inhibit the response. The Go/Stop task used was adapted from research by Fillmore and Vogel-Sprott (1999; 2000).

Offenders were instructed to respond to the letters "X" and "O" (the go stimuli), which were presented in black font one at a time in the center of the computer screen for two seconds. When the letter "X" was displayed offenders were told to respond with the number '1' key, when the letter "O" was displayed offenders were told to respond with the number '9' key. The interstimulus interval was two seconds, indicated by a one second presentation of a fixation point (plus sign) displayed in the center of the screen.



When the stop stimuli was presented (a change in the font colour of the "X" or "O" from black to red), the offender was supposed to inhibit their response. The stop stimuli occurred randomly in approximately 40% of the trials, and the onset of the font colour change after the presentation of the black letter varied (e.g., 250ms, 500ms, or 750ms). The task was completed after 120 trials were presented.

Inhibitory control was the dependent variable of interest, this was measured by the number of times the offender inhibited their response to a stop stimuli. A relatively new measure, the Go/Stop task has been used to investigate impulsivity in relation to addictive behaviours (e.g., alcohol use, Fillmore & Vogel-Sprott, 1999; 2000; and substance use, Fishbein et al., 2005).

*Recidivism data.* Recidivism data was collected for the entire sample at the same date, approximately two years following the original time of assessment of ECF abilities. Depending on their release date during the follow-up period, participants were followed for between 25 and 767 days, with an average of 404 days ( $SD = 188$  days). Thus, unlike some studies using recidivism data as an outcome measure, there is not an identical follow-up period for all offenders. Information regarding participants' legal infractions following release was provided by the Correctional Service of Canada (CSC). Following the convention in recidivism research with federal offenders (Bonta, Rugge, & Dauvergne, 2003), recidivism was defined as a custodial admission to a federal institution for the violation of a release condition (defined by CSC as revocation without offense) or the commission of a new offense during the follow-up period (defined by CSC as revocation with offense, if offender has been charged with a specific offense or

revocation with outstanding charge, if the offender has been remanded to custody while the specific charges have yet to be named by the police).

There were several dispositions that offenders were eligible to be released under: full parole, day parole, statutory release, or warrant expiry. Both full parole and day parole were categorized as dispositions that indicate 'good' correctional institution behaviour, meaning that offenders receiving these dispositions can be thought of as conforming to the expectations and requirements of institutional life. On the other hand, statutory release and warrant expiry were categorized as dispositions that indicate 'poor' correctional institution behaviour, meaning that offenders receiving these dispositions can be thought of as exhibiting disciplinary problems, poor participation in programming, and other behavioural issues.

Recidivism data was not able to be collected for 14 participants due to their refusal to allow researchers to access their post-release criminal records or problems with gathering recidivism data from the CSC. This left a final total of 81 participants for the final analysis, of which 54 were released during the follow-up period.

### Results

The following analyses were conducted in order to address the proposed hypotheses. Multivariate Analysis of Variance (MANOVA) was selected as the appropriate analytic strategy as each of the three hypotheses explored the possible differences between a number of dependant variables, each thought to reflect some aspect of ECF, for two groups of offenders. For each group comparison, a one-way MANOVA was run on the test battery of ECF measures (CNA, SMS, WCST, Go/No-Go, Go/Stop). Given the nature of empirical questions asked, MANOVA provides a more conservative

approach that controls for inflation of Type I error. Since MANOVA works best with highly correlated dependant variables and acceptably well with moderately correlated dependant variables, a correlation matrix for the dependant variables was produced. The correlation among scores on the five ECF measure were found to range from .05 to .93, with the great majority of correlations falling with the range of .26 to .70, signifying an appropriate amount of intercorrelation to perform a MANOVA.

As offender samples from both Springhill and Fenbrook institutions were combined for the subsequent analyses, it was important to determine if any differences existed between the two populations of offenders. A series of t-tests found both groups of offenders to be similar on all executive function variables (significance values ranged from .11 to .84), meaning that both institutional samples could be combined without concern of biasing the overall sample.

Before statistical analyses were conducted, the normality of the data was assessed by examining skewness and kurtosis. To normalize the data a square root transformation was used. Unfortunately, the selected transformation was unable to completely normalize all variables, instead only decreasing the degree to which they were skewed. Those variables where the majority of offenders scored in the upper or lower limits were particularly affected. Generally, MANOVA is a relatively robust to most violations of the assumption of normality, as long as sample sizes are equal and not overly small, consequently analysis proceeded without reservation (Gardner & Tremblay, 2006).

Another important assumption to consider when using MANOVA is the equality of the covariance matrices. This means that the covariance matrices of the dependent variables are equal across groups; given  $a$  treatment conditions and  $p$  dependent

variables, it is assumed that *a* covariance matrices are equal in the population (Gardner & Tremblay, 2006). This assumption is tested by Box's test of equality of covariance matrices. For each of the three MANOVA analyses, Box's test was nonsignificant<sup>2</sup>, meaning that there is insufficient evidence to reject the null hypothesis that the two covariance matrices for each individual MANOVA analysis are drawn from populations with identical covariance matrices. Consequently, the tests of multivariate effects can be interpreted without concerns about potential biases.

*Differences in ECF between Institutional Conformists and Institutional Non-conformists*

The first objective of the current study was to investigate the extent to which offenders released for 'good' correctional institution behaviour, labeled 'institutional conformists', and offenders released after 'poor' correctional institution behaviour, labeled 'institutional non-conformists', differed from each other on various ECF abilities

Of the 81 offenders, 54 were released during the two year follow-up period. Of the 54 offenders released, 28 were considered 'institutional conformists' as they were released either through full or day parole and 26 were considered 'institutional non-conformists' as they were released either through statutory release or due to warrant expiry. Preliminary analyses of demographic variables found both groups to be similar in age,  $F(1, 52) = 2.14, p = .15$ , level of education,  $F(1, 48) = 0.00, p = .99$ , and length of sentence,  $F(1, 51) = 0.77, p = .38$ .

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<sup>2</sup> A significance level of .01 or less indicates a significant test statistic.

Box's test for objective one, ECF differences between institutional conformists and institutional non-conformists was nonsignificant,  $F(55, 8628.34) = .99, ns$ .

Box's test for objective two, ECF differences between recidivists and non-recidivists was nonsignificant  $F(55, 6619.00) = .497, ns$ .

Box's test for objective three, ECF differences between early recidivists and late recidivists was nonsignificant  $F(55, 1992.41) = .042, ns$ .

A MANOVA examining ECF performance by group membership revealed non-significant multivariate effects, preventing further analysis at the univariate level (Pillai's Trace = 0.06,  $F(10,43) = 0.26$ ,  $p = .99$ ). The means and standard deviations for both groups of offenders are shown in Table 1. Looking at the results, it is clear that the expected differences in ECF between offenders released for 'good' behaviour and those released after 'poor' behaviour did not materialize and so it must be concluded that the proposed hypothesis was not supported by the data.

*Differences in ECF between Recidivists and Non-recidivists*

The second objective was to investigate whether offenders who were able to avoid returning to a correctional institution after release, labeled 'non-recidivists' ( $n = 33$ ), differed in ECF abilities from offenders who had been returned to a correctional institution after release, labeled 'recidivists' ( $n = 22$ ). Out of the offenders released from the correctional institutions during the follow-up period, 40.7% recidivated. The majority of offenders (68.1%) were returned to federal custody for violating one or more of the conditions of their release. Due to the substantial body of literature supporting the presence of ECF deficits and increased antisocial behaviour, it was important to investigate possible associations in this sample. Again, demographic variables for the two groups were examined, revealing no significant differences in their ages,  $F(1, 52) = 0.84$ ,  $p = .36$ , level of education,  $F(1, 48) = 2.29$ ,  $p = .14$ , and length of sentence,  $F(1, 51) = 0.69$ ,  $p = .41$ .

Table 1

*Means and Standard Deviations of Executive Cognitive Function Measures for Institutional Conformists and Institutional Non-conformists*

Measure	<u>Institutional</u> <u>Conformists</u> <sup>a</sup>		<u>Institutional</u> <u>Non-conformists</u> <sup>b</sup>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
CNA				
Trials to completion	10.84	2.57	10.21	2.50
Number of errors	9.92	4.60	8.92	3.70
Number of incorrect trials	6.82	2.70	6.17	2.33
SMS				
Total score	2004.98	1017.48	1882.29	896.71
WCST				
Perseverative errors	10.01	1.16	10.01	1.29
Number of trials to complete first category	4.79	2.44	4.26	2.20
Failure to maintain set	0.69	0.71	0.66	0.71
Go/No-Go				
Errors of commission	3.61	1.62	3.23	1.43
Errors of omission	2.07	1.01	2.10	0.95
Go/Stop				
Impulsive responses	2.68	1.25	2.67	1.08

*Note.* Multivariate  $F(10,43) = 0.26, p = .99$ . CNA = Conditioned Nonspatial Association Test; SMS = Somatic Marker Sensitivity Test; WCST = Wisconsin Card Sort Test

<sup>a</sup>  $n = 28$ . <sup>b</sup>  $n = 26$

A MANOVA examining ECF performance by group membership revealed non-significant multivariate effects preventing further analysis at the univariate level, Pillai's Trace = .12,  $F(10,43) = .59$ ,  $p = .82$ . The means and standard deviations for both offender groups are shown in Table 2. With no evidence to suggest that the null hypothesis should be rejected, it must be concluded that these findings do not support the assertion that continued offending behaviour after release from correctional custody (as measured by recidivism) is related to deficient ECF performance.

*Differences in ECF between 'Early' Recidivists and 'Late' Recidivists*

The final objective of this study was to investigate whether there were differences in ECF abilities between offenders who returned to a correctional institution after a short period of time following release from institutional custody and those offenders who returned to a correctional institution after a longer period of time following release from institutional custody. A quartile split procedure was used to dichotomize the number of days before an offender was returned to a correctional institution. This created two groups of offenders, those who returned to federal custody within 132 days or less, 'early' recidivists ( $n = 13$ ), and those who returned to federal custody after more than 446 days, 'late' recidivists ( $n = 14$ ). A quartile split was selected over a median split because the difference between the groups formed via a quartile split was thought to be more meaningful than the groups formed via a median split ('early' recidivists of 150 days or fewer, as compared to 'late' recidivists of 151 days or more). Additionally, the use of a quartile split would help us to speak to the shape of the relationship between ECF and recidivism: if 'early' and 'late' offenders were found to have similar ECF abilities, it would suggest that the likelihood of recidivism is the same once a certain

Table 2

*Means and Standard Deviations of Executive Cognitive Function Measures for Recidivists and Non-recidivists*

Measure	Recidivists <sup>a</sup>		Non-recidivists <sup>b</sup>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
CNA				
Trials to completion	10.57	2.71	10.51	2.45
Number of errors	9.96	4.91	9.08	3.63
Number of incorrect trials	6.77	2.77	6.32	2.37
SMS				
Total score	2102.27	1072.99	1838.41	864.56
WCST				
Perseverative errors	9.91	1.29	10.08	1.17
Number of trails to complete first category	4.36	2.06	4.66	2.51
Failure to maintain set	0.88	0.69	0.54	0.69
Go/No-Go				
Errors of commission	3.59	1.61	3.31	1.49
Errors of omission	2.09	0.81	2.08	1.09
Go/Stop				
Impulsive responses	2.54	1.31	2.76	1.06

*Note.* Multivariate  $F(10,43) = .59, p = .82$ . CNA = Conditioned Nonspatial Association Test; SMS = Somatic Marker Sensitivity Test; WCST = Wisconsin Card Sort Test

<sup>a</sup>  $n = 22$ . <sup>b</sup>  $n = 32$

'threshold' of ECF dysfunction is met; on the other hand, if significant differences in ECF were found between 'early' and 'late' recidivists, it would suggest that there may be a linear relationship between the degree of ECF deficits and likelihood of recidivism exists. While dichotomizing an independent variable restricts range, limits the amount of variance in the data, and lowers the power of obtaining statistical significance, it allows



for the use of simplified data analytic strategies. Despite some of the disadvantages, researchers have justified the use of dichotomization because it almost always produces a conservative bias for subsequent analyses (Maxwell & Delaney, 1993). Additionally, the use of the quartile split procedure (also referred to as the extreme groups approach) has been shown to increase statistical power given a small sample size, and is especially well-suited to the exploratory phase of research, when the exact form of the relationship is unknown (Preacher, Rucker, MacCallum, & Nicewander, 2005). Once more, demographic variables for the two groups of recidivists were examined, revealing no significant differences in their ages,  $F(1, 25) = 2.15, p = .16$ , level of education,  $F(1, 22) = 3.52, p = .07$ , and length of sentence,  $F(1, 24) = 2.26, p = .15$ .

A MANOVA using group membership as the independent variable and all ECF variables as the dependent variables revealed significant multivariate effects allowing further examination at the univariate level, Pillai's Trace = .61,  $F(10, 16) = 2.54, p < .05$ . Six specific measures of ECF were found to differ significantly between early and late recidivists (see Table 3 for means, standard deviations and univariate results).

On the CNA task, the early recidivists differed significantly from the late recidivists in all three measures of interest, with early recidivists performing significantly worse than late recidivists: number of trials to completion,  $F(10, 16) = 7.15, p < .01$ ; total number of errors  $F(10, 16) = 8.73, p < .01$ ; and number of incorrect trials  $F(10, 16) = 7.46, p < .01$ . As there were two ways for the CNA task to reach completion (either after 18 consecutive correct trials or after 180 total trials were administered), we would expect a range in the total number of trials to completion, with completion due to consecutive correct trials resulting in the more advantageous outcome of fewer trials administered,

Table 3

*Means and Standard Deviations of Executive Cognitive Function Measures for Early Recidivists and Late Recidivists*

	<u>Early</u> <u>Recidivists</u> <sup>a</sup>	<u>Late</u> <u>Recidivists</u> <sup>b</sup>			Observed
Measure	<i>M</i>	<i>M</i>	<i>F</i> (10,16)	$\eta_p^2$	Power
CNA					
Trials to completion	12.33 (1.49)	10.09 (2.65)	7.15**	.22	.73
Number of errors	12.45 (4.53)	8.07 (3.08)	8.73**	.26	.81
Number of incorrect trials	8.20 (2.47)	5.75 (2.20)	7.46**	.23	.75
SMS					
Total score	1937.66 (939.62)	1728.57 (1051.87)	0.30	.01	.08
WCST					
Perseverative errors	9.71 (1.16)	9.94 (1.31)	0.23	.01	.08
Number of trials to complete first category	4.69 (1.55)	3.60 (0.65)	4.95*	.17	.57
Failure to maintain set	0.79 (0.70)	0.61 (0.67)	0.45	.02	.10
Go/No-Go					
Errors of commission	4.38 (1.10)	2.92 (1.51)	8.13**	.25	.78
Errors of omission	2.62 (0.77)	1.80 (1.13)	4.73*	.16	.55
Go/Stop					
Impulsive responses	2.51 (1.56)	2.81 (0.98)	0.37	.02	.09

*Note.* Multivariate  $F(10,16) = 2.54$ ,  $p = .05$ . CNA = Conditioned Nonspatial Association Test; SMS = Somatic Marker Sensitivity Test; WCST = Wisconsin Card Sort Test.

$\eta_p^2$  = Partial eta squared

<sup>a</sup>  $n = 13$ . <sup>b</sup>  $n = 14$

\* $p < .05$ , \*\* $p < .01$

fewer total errors and fewer incorrect trials, while completion due to the administration of 180 trials will result in a larger number of trials to completion, total number of errors, and number of incorrect trials. Larger scores on all three variable of interest reflect inferior performance on this measure, more specifically inferior levels of response monitoring, strategy formation, and associative learning on the part of offenders.

Similar to the CNA task, early recidivists differed significantly from late recidivists, requiring a greater number of trials to complete the first category on the WCST,  $F(10,16) = 4.95, p < .05$ . Number of trials to complete the first category provides an indication of the individual's initial conceptualization of the task, ability to profit from corrective feedback, and ability to monitor their responses as the task continued. More specifically, larger scores on this variable indicated difficulties with aspects of working memory, strategy formation and response monitoring by early recidivists.

Within the Go/No-Go task, both number of errors of commission,  $F(10,16) = 8.13, p < .01$ , and number of errors of omission,  $F(10,16) = 4.73, p < .05$ , were found to be significantly higher among early recidivists as compared to late recidivists. These two variables of interest are important measures of impulsivity; errors of commission signify a failure to inhibit responses to stimuli that have previously been paired with punishment, whereas errors of omission represent a failure to respond to positive stimuli and speak more to failure to attend appropriately to the task at hand. The fact that early recidivists showed greater deficits in their ability to inhibit impulsive responding than late recidivists is significant, given the association between antisocial behaviour and impulsivity.

Overall, the pattern of results was showed that early recidivists were found to have poorer performance on a variety of measures of ECF, particularly those variables

tapping response monitoring, working memory, and impulsivity/inhibition and the ability to develop strategies in order to solve a problem. The observed effect sizes for the significant results would be considered large ( $\eta_p^2$  values ranged from .16 to .26)<sup>3</sup> using Cohen's (1988) designations<sup>4</sup>. While recidivism is a multiply determined behaviour, it is meaningful that such large effects were detected with a relatively small sample size.

It is important to note that there were no significant differences between early and late recidivists on several variables of interest (SMS total score, WCST perseverative errors, WCST failure to maintain set and Go/Stop impulsive responses). For the nonsignificant results, it should be noted that the observed power of detecting a true difference using the MANOVA test statistic with Type I error set at .05 ranged from .08 to .10. This means that for the current study, the ability to detect an effect of the nonsignificant ECF measures was poor (given that the effect actually exists). As a comparison, ideally power is set at .8, meaning that approximately 80% of the time the specified tests will detect an effect, given that it actually exists (Gardner & Tremblay, 2006). Typically low power is a result of errors in study design. For example, Fraley and Marks (2007) have suggested that using too small a sample, selecting an effect for study that has a small true effect in the real world, or selecting too low an alpha level will all decrease power. Additionally, those authors pointed to selecting too short a follow-up period for a longitudinal study as limiting power, which certainly could have been the

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<sup>3</sup> Partial eta squared ( $\eta_p^2$ ) is the effect size measure of choice for use with MANOVA analyses. Because MANOVA by definition involves non-independent results, the traditional effect size statistic of  $\eta^2$  is not recommended (see Tabaschnick & Fidell, 2007, for a discussion). Partial eta squared for an experimental factor is defined as a measure of the proportion of total variance attributed to the factor, partialing out (excluding) other factors in the equation/model.

<sup>4</sup> Although Cohen (1988) specified guidelines for interpreting the strength of eta squared, according to Pallant (2007), they can be used to interpret the strength of partial eta squared without alteration.

case in the current study, given that our follow-up period was as few as 25 days in some cases.

### Discussion

The central goal of the current study was to investigate whether or not there was a relationship between offenders' executive cognitive functioning (ECF) abilities and recidivism. More specifically, we examined the relationship between offenders' ECF abilities and their reoffending behaviour once they had been released from a correctional institution, as well as the relationship between offenders' ECF and their behaviour leading up to release. To achieve this task, recidivism data on 81 male offenders serving sentences in one of two medium security Canadian federal institutions was collected two years after the assessment of their ECF abilities. While the current study used a novel approach in attempting to answer the question of why some offenders reoffend while others do not, forensic research supported this as a promising avenue, as ECF abilities have recently been proposed as a possible target for remediation programs (Broomhall, 2005), given the strong association between ECF and antisocial behaviour (e.g., Giancola et al., 1998; Guerra & Slaby, 1990; Hoaken et al., 2007).

We investigated the relationship between ECF and recidivism through the following three objectives: assessment of the differences of ECF abilities between institutional conformists and institutional non-conformists, assessment of the differences of ECF abilities between recidivists and non-recidivists, and assessment of the differences in ECF abilities between early recidivists and late recidivists. It was felt that these three objectives would provide a comprehensive examination of the multifaceted

relationship between ECF and recidivism. In this section, we will discuss the results of the three objectives, along with limitations and directions for future research.

### *Institutional Conduct and Executive Cognitive Functions*

The first objective aimed to establish a relationship between ECF and institutional conformity, with the idea being that institutional non-conformists would show worse performance on measures of ECF than institutional conformists as their greater ECF deficits would presumably make it difficult to learn the rules of institutional conduct, choose appropriate ways of responding and function well in the forensic setting in general. Very few studies have looked at the relationship between institutional conduct leading to release and subsequent recidivism (e.g., Nugent, 2001), and fewer, if any, have looked at the relationship between ECF abilities and institutional conduct. This hypothesis was deemed important to study as it was thought that the presence of institutional non-conformity would act as an early indicator of future recidivism, where recidivism following release from prison could be conceptualized as a continuation of the same behaviour pattern of refusal to follow the rules of society, be it in prison or not (Camp & Gaes, 2005). A variable that predicts misconduct and future recidivism would have tremendous implications regarding the identification and treatment for those most at risk for failure once released from incarceration. While intuitively pleasing, it was clear from the results that this hypothesis was not supported as there were no significant differences in ECF measures (CNA, SMS, WCST, Go/No-Go, and Go-Stop) between institutional conformists and institutional non-conformists.

Although not in the direction hypothesized, these results are perhaps not unexpected, given the multitude of variables that have already been found to be

associated with institutional misconduct. For example, age, race, criminal history, substance abuse, education, employment, prior incarcerations, family problems, criminal associates, current prison time served, inmate-staff ratio, length of sentence and institutional overcrowding, among others, have all been shown to predict institutional misconduct (Cao, Zhao, & Van Dine, 1997; Hochstetler & DeLisi, 2005; Sorenson, Wrinkle, & Gutierrez, 1998; Wooldredge, Griffin, Pratt, 2001). In order to deal with the great number of predictors of institutional misconduct among adult offenders, two theoretical models have been proposed: the deprivation model, which proposes that institutional conduct is largely the result of an individual's response to the 'abnormal' prison environment, in that an inmate may be forced into misconduct in order to cope with the distress of imprisonment regardless of their personal characteristics; and the importation model, which proposes that an individual's behaviour once imprisoned is largely influenced by their past experiences and personal characteristics and not the prison environment itself (Trulson, 1997). According to the deprivation model, situational factors like arbitrary rule enforcement by guards, staff-inmate ratio, overcrowding, length of sentence, or security level of the institution are all likely to impact the probability of institutional misconduct. Alternatively, the importation model suggests that the variables likely to influence the probability of institutional misconduct are related to the individual's personal, social and criminal history, such as education level, personality style, history of violence, parental and sibling criminality, or gang membership.

Numerous studies have attempted to find support for either the deprivation or importation model, and the results have been equivocal with some finding evidence for

the deprivation model in whole or part (Gover, Mackenzie, & Armstrong, 2000; Hochstetler & DeLisi, 2005; Jiang & Fisher-Giorlando, 2002), others for the importation model in whole or part (Cao et al., 1997; Harer & Steffensmeier, 1996; Hochstetler & DeLisi, 2005; Kellar & Wang, 2005; Sorenson et al., 1998), and still others finding evidence for alternate models using similar variables (e.g., the situational model proposed by Jiang & Fisher-Giorlando, 2002). Clearly the association of ECF abilities with institutional misconduct would lend credence to the importation model; the fact that this was not the case would seem to indicate a lack of support for this model. However, it may be that even if there was a significant relationship between ECF deficits and institutional misconduct, this relationship would not be especially meaningful; in a meta-analysis of 14 studies, Gendreau and colleagues (1997) found cognitive abilities (including some of those subsumed under the umbrella of ECF) to not predict institutional misconduct ( $r = -.01$ ). While these findings seem to corroborate that assertion that institutional non-conformists do not suffer from ECF deficits, it is important to discuss the limitations of the above meta-analysis. In describing the studies analyzed, the authors noted that the great majority failed to provide critical methodological descriptors such as the length of follow-up period or the measures of ECF used. Additionally, as the meta-analysis included studies from the 1940s to 1990s, it is doubtful that all the measures of ECF used were all empirically derived or psychometrically sound. As ECF is a relatively new concept and the research community is still developing appropriate measurement tools (Homack, Lee, & Riccio, 2005), it can safely be assumed that a number of the included studies used measures that pre-date much of the research on executive function and neuroanatomy. Finally, by not providing



an operational definition for executive functions, it is difficult to ensure that we are speaking of the same concepts. For these reasons the findings of Gendreau and colleagues cannot be accepted at face value. Although the results of the current study indicated that institutional non-conformists did not suffer from ECF deficits, and there may still be a relationship between institutional conformity and ECF that has yet to be discovered. On the other hand, it may simply be that the relationship between ECF and institutional misconduct is not as consequential as first proposed.

### *Repeated Criminal Behaviour and Executive Cognitive Functions*

Of the three objectives investigated in the current study, this was considered to be the most central as it explicitly addressed the question of whether or not there is a relationship between ECF and recidivism. Although current remediation programming has been shown to significantly reduce the rates of reoffending, it remains the case that these programs are not equally effective across all offenders (Gendreau et al., 1999). Considerable resources have been dedicated to identifying possible factors to account for this variability in effectiveness, with the intention that if we are able to determine which factors are related to future offending behaviour we would be better able to target our remediation programming to address these criminogenic needs. With that in mind, the second objective of the current study was to determine whether offenders who had been able to avoid returning to a correctional institution upon release ('non-recidivists'), differed in ECF abilities from offenders who had been returned to a correctional institution ('recidivists'), the idea being that if significant differences were found, they would have the potential to inform the development of new remediation programs or the modification of current programs to address these deficits. Looking at the considerable

relationship between deficits in ECF abilities, antisocial behaviour and associated behavioural deregulation, it was expected that recidivists would show poorer performance on measures of ECF than non-recidivists. Unfortunately, much like objective one, this hypothesis was not supported by the results as there were no significant difference in ECF measures (CNA, SMS, WCST, Go/No-Go, and Go-Stop) between recidivists and non-recidivists.

While there are many possible explanations for this unexpected result (e.g., issues with measurement selection, general issues in conducting forensic research, offender heterogeneity, small sample size; these issues will be explained more fully in a later section focusing on general study design limitations), we have identified three explanations as being the most feasible: too short a follow-up period, not dividing the offenders into reactive and instrumental groups, and issues related to the use of official criminal records as a source of recidivism. These are discussed below.

Regarding the length of follow-up period, as recidivism data was collected for the entire sample of offenders at the same date approximately two years following the assessment of ECF abilities, offenders did not have identical follow-up periods. Consequently, offenders were 'at risk' to offend for between 25 days and 767 days, depending on their release date. More specifically, 10 out of 54 offenders (18.5%) were followed for less than 3 months, and a further 13 (20.1%) were followed for less than 6 months. Although examining short-term follow-ups with offenders has been deemed an ecologically valid inquiry (Kroner & Mills, 2001), it is still the case that it is not an ideal situation. With a longer period of time at risk to reoffend, more meaningful data can be collected on offenders and their post-release behaviour. For example, when an offender is

followed for only 60 or 90 days post-release, a return to prison communicates important information regarding the offender's inability to adapt and function in society after imprisonment, which presumably would be associated with substantial ECF deficits (in support of this argument, see the discussion of objective three results below). A failure to return to prison after such a short period of time at risk, however, communicates less about the offender; we are unable to truly comment on whether the offender is able to follow the laws of society, presumably due to sufficient ECF capacities, or just that they have yet to reoffend (or have yet to be caught by the authorities). In examining a variable like ECF, whose deficits are known to express themselves differently from person to person and span a 'continuum of disability' ranging from slight impairment (e.g., failures in task that require sustained attention) to disability (e.g., poor performance in real-world tasks that require the integration of multiple cognitive skills that comprise ECF) to handicap (e.g., the inability to perform social roles, such as the impairment seen in frontal lobe syndrome), it may be that those experiencing relatively less ECF impairment would eventually recidivate if given enough time (Chan et al., 2008). It is possible that the relationship between ECF and recidivism is linear, meaning that as ECF impairment increases, the likelihood of recidivism increases. Just like the distribution of many individual differences, it can be expected that the offenders in our sample would range in ECF abilities; the short follow-up period may have artificially restricted the true amount of reoffending that would have occurred if the sample would have been followed for a longer time frame, and that over a longer period the effects of more minor ECF deficits may have expressed themselves as behaviour that would result in reoffending.

Another possible reason for the lack of relationship between ECF measures and recidivism has to do with the way the offenders were classified, or in this case, not classified. It has been suggested by several researchers that the distinction between instrumentally aggressive offenders and reactively aggressive offenders is important to consider when discussing the relationship between ECF and antisocial behaviour (Broomhall, 2005)<sup>5</sup>. For example, Raine and colleagues (1998) used positron emission tomography (PET) to determine that reactive violent offenders, whose crimes are characterized by expressions of aggression and violence either in defense against a threat or in reaction to a perceived environmental/interpersonal stressor, had significantly lower prefrontal metabolic activity than instrumental violent offenders, whose crimes are characterized by the expression of violence that is secondary to the acquisition of some other external goal. Furthermore, Woodworth and Porter (2002) found reactive violent offenders to be more impulsive than instrumental violent offenders, while Broomhall (2005) showed reactive violent offenders to be significantly more impaired on multiple measures of ECF than instrumental violent offenders. Additionally, Walters and colleagues (2007) suggest that reactive violent offenders may benefit from programming addressing social and cognitive deficits related to executive functions more so than instrumental offenders, who instead may benefit from programming designed to confront their beliefs about the perceived cost and benefits of crime. These findings imply that the impact of ECF abilities on future recidivism may vary depending on the type of offense, either reactive or instrumental, that the individual has committed. For this reason, it could

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<sup>5</sup> The distinction between instrumental and reactive offenders has also been suggested to be true for non-violent offenders (Robinson, 1995; Wilson, Attrill, & Nugent, 2003), however as much of the research examining this classification and its relationship to ECF and antisocial behaviour is limited to violent offenders, non-violent offenders will not be discussed.

be possible that if offenders were separated into instrumental and reactive groups prior to analysis, we may have seen a difference in ECF abilities between recidivists and non-recidivists, for at least the reactive offenders. The small sample size prevented such analysis; nevertheless, the relationship between instrumental and reactive offending, executive functions and recidivism warrants further investigation.

Finally, one other possibility to explain the results we obtained is related to the use of official criminal records as the source of recidivism data. According to Bonta and colleagues (2003), there is no commonly accepted measure of recidivism, although it is frequently defined as a custodial admission (either due to the violation of release conditions or the commission of a new offense) to a correctional institution during the period of release. While this definition was used in the current study, Bonta's group stress the importance of considering both the advantages and disadvantages when selecting a measure of recidivism. For instance, how do we know that someone has reoffended? It is common knowledge that many criminal offenses go unreported or undetected, which raises the possibility that official criminal records may underestimate true offending patterns (Porter, Birt, & Boer, 2001). Additionally, official criminal records may not represent the nature of the offenses committed, as they do not take into account the results of plea bargaining. For example, it is not uncommon for plea bargaining to reduce multiple charges to a single charge or to reduce a serious charge like assault to a lesser charge like mischief (Porter et al., 2001). Another issue is that criminal records give the date of adjudication, not the date of crime commission, meaning that although an offender may have recidivated during the period of observation, but if they have not been detected or adjudicated, this instance of recidivism would not be detected. Given these

disadvantages, it is conceivable that if we had defined recidivism differently, we may have found a significant difference in ECF abilities between recidivists and non-recidivists. However, as stated earlier, seeing that no measure of recidivism is free from bias, we ultimately decided to follow the established convention in forensic research in selecting our definition of recidivism.

### *The Timing of Recidivism and Executive Cognitive Functions*

The last objective of the current study was to investigate whether there were differences in ECF abilities between offenders who returned to a correctional institution after a short period of time (less than 132 days), labeled 'early' recidivists, and those offenders who returned to a correctional institution after a longer period of time (more than 446 days), labeled 'late' recidivists. As stated earlier, because this objective was exploratory in nature, no formal hypothesis was made. With that being said, the results did reveal significant differences in ECF performance between early and late recidivists, suggesting that there may be a linear relationship between the degree of ECF deficits and likelihood of recidivism. Compared to late recidivists, early recidivists made significantly more errors, had more incorrect trials and needed more trials to complete the Conditioned Nonspatial Association (CNA) test, which denotes poor strategy formation, response monitoring of recently learned information, learning of contingent associations and active monitoring in working memory. Additionally, they required more trials at the start of the Wisconsin Card Sorting Test (WCST) before recognizing the task objective, further indicating disruptions in working memory and response monitoring. Also, early recidivists were less able to inhibit responses to negative stimuli or respond to positive stimuli on the Go/No-Go task (making more errors of commission and omission),

indicating heightened levels of impulsivity and poor attention to the task at hand. Based on the ECF battery employed, the pattern of deficits suggests the compromised ability to cope with a shifting-problem solving paradigm, difficulty developing well-thought out strategies and monitoring outcomes, problems in the ability to retrieve information kept in temporary storage for immediate use, issues with inhibiting inappropriate responses, and problems attending to salient stimuli. These domains reflect both dorsolateral and orbitofrontal aspects of frontal lobe function, and are indicative of diminished ECF abilities.

Seeing as this was a novel research question there are very few studies with which to compare our findings, however some researchers have investigated related questions. As discussed earlier, researchers using similar ECF measures have shown impaired ECF performance to be related to increased criminality and antisocial behaviour. For instance, deficits on the CNA test have been reported in groups of violent offenders (Hoaken et al., 2007), incarcerated psychopaths and juvenile delinquents have shown increased errors of commission on the Go/No-Go task (Newman, Patterson, Howland, & Nichols, 1990; Patterson et al., 1987), and both reactively aggressive subjects and offenders have shown similar deficits on the WCST (Bergvall, Nilsson, and Hansen, 2003; Stanford, Greve, & Dicken, 1995).

Considering the ECF variables where significant differences were observed, it is probable that the inferior performance shown by early recidivists can be implicated in their premature return to institutional custody. The deficits displayed by early recidivists in the areas of strategy formation, response monitoring, working memory, impulsivity and attention likely reflect impairments in overall problem-solving abilities and are

suggestive of individuals poorly equipped to cope with both routine and novel experiences. Successful problem solving can be broken down into a sequence of actions: planning, initiation of the plan, and evaluation of the outcome (which includes regulation of the actions of the plan). Within this complex chain of events, several aspects of ECF are involved: the act of strategy formation is critical to planning, while the evaluation of the planned behaviour is heavily dependent on working memory, associative learning and response monitoring (Ross et al., 2008). In contrast, impulsivity and inattention may act as a barrier to the initiation of the above processes or impede the sequence of actions. While these findings seem to indicate that executive functions play a role in criminality, they are also suggestive of a role for executive functions in recidivism. More specifically, if an offender has deficient ECF (and as a result, inferior problem-solving abilities and other related cognitive processes), it is not hard to picture the difficulties he will have navigating through situations with the potential for criminal actions (e.g., solving financial strain, navigating a provocative interpersonal encounter, responding to interpersonal rejection). For example, if an individual's ability to formulate strategies is impaired, he will necessarily generate fewer possible courses of action, and needlessly limit their options. Additionally, if they do not have the skills to properly monitor the results of previous responses because of working memory deficits or deficient associative learning, future responses may be poorly formulated. Finally, increased impulsivity or inattention may obstruct the completion of any of the steps along the process, further complicating the process. Taken together, these deficiencies result in a repetitive cycle of poorly thought out behaviour, selected from a limited and often impaired assortment of



response options that are then carried out impulsively without the proper foresight and planning, all of which may result in continued criminal involvement.

We can look to Clarke and Felson's (1993) rational choice perspective model to expand on how the previously discussed deficits may lead to repeated criminal behaviour. The rational choice perspective assumes that the offender is a calculating decision maker who weights the positive and negative consequences before deciding to commit an offence. However, the extent to which individuals are likely to gather and make use of all relevant information when making decisions has been questioned; instead it has been suggested that under constraints, such as time, anxiety, or as suggested here, deficits in executive functions, individuals turn to heuristics to edit the information required to make a decision (Wilson, Attrill, & Nugent, 2003). To support this, studies have shown that the way a problem is framed and the number and salience of constraints present can influence the decision that is made (Kahneman & Tversky, 1984). Thus, it may be the case that decision making is not the rational process described by Clarke and Felson, instead it is more of a limited rationality where individuals make use of previous experience or imprecise rules of thumb in deciding on a course of action (Wilson et al., 2003). In this way, deficits in executive functions could adversely influence the type or quality of information used in the problem-solving process, or the ability to identify useful heuristics.

It was hoped that the results of this objective would complement the findings of the second objective, adding greater detail to the (hopefully established) relationship between impaired ECF and recidivism in this sample of federal offenders. While this was not the case, there is a possible explanation for the observed pattern of results. Given that

there were significant differences in ECF abilities between early and late recidivists, the fact that the second objective combined these two groups to form the recidivist group may help to explain why there were no significant differences found in ECF abilities between recidivists and non-recidivists. While this may sound puzzling, the larger study by Ross and colleagues (2008), upon which this study is based, provides clarification. In their study examining the ECF abilities of repeat and first-time offenders, the authors found that in terms of executive abilities, although repeat offenders performed significantly worse than first time offenders and community controls, first time offenders showed no ECF deficits when compared to community controls. Supporting these findings, it has been shown that repeat offenders have higher and more varied levels of criminogenic needs than other offenders (Polaschek & Collie, 2004). It may be that early recidivists may be more ingrained criminals who are likely to be repeat offenders, while late recidivists may be more limited criminals who resemble first-time offenders. As demonstrated by their lengthy criminal histories, repeat offenders have shown themselves not to be deterred by formal involvement with the judicial system and periods of incarceration. According to Nagin and Porgarsky (2004), it may be that individuals who are not deterred by consequences are either unwilling, or as suggested here, unable, to consider the consequences due to impairments, or alternatively, they may simply ignore the cost of future consequences. The relationship between recidivism and ECF may be more complicated than first proposed, and there may be an interactive relationship between history of offending, ECF and recidivism; it is possible that there are significant individual differences between first timers and return offenders which affect their criminogenic path, of which impaired ECF may be one. For these repeat offenders that

have already been shown to have impaired ECF abilities, if they were also shown to be classified as early recidivists, it would further strengthen the relationship between recidivism and impaired ECF. Needless to say, future research investigating these apparent differences between the ECF capabilities of return offenders and first time offenders, and their relation to recidivism is needed.

An important consideration to keep in mind is that the causes of recidivism are multiply determined, and risk factors range across a spectrum from antisocial attitudes to substance abuse to lack of employment to lack of family support. Early recidivists are more likely to have a number of these risk factors, of which impaired ECF abilities is just one (Byrne, Byrne, Hillman, & Stanley, 2001). Late recidivists, on the other hand, obviously have some risk factors given that they have reoffended, however impaired ECF seems not to be one of them. An alternative explanation however, is that deficient ECF may simply play a larger role in the reoffending behaviour of early recidivists as compared to late recidivists, since late recidivists may still have ECF deficits relative to community controls. If we had collected data regarding the presence of additional risk factors, we might have been able to clarify these findings, as it stands now, both explanations are equally plausible.

#### *General Issues: Limitations and Directions for Future Research*

Several limitations in the current study are worthy of discussion. As detailed earlier, ECF comprises a wide range of cognitive processes and behavioural competencies, and as such, tasks that purport to measure the various components of ECF cover a wide range of processes, some of which have been implied to be non-executive functions. For example, although ECF measures like the WCST appear to measure

functions that are theoretically central to the prefrontal cortex, and therefore executive functioning, it has been implied by some researchers that they may measure multiple functions, including non-executive components that are unlikely to be specific to the prefrontal cortex (Pennington & Ozonoff, 1996). Whereas ECF abilities are predominantly attributed to the dorsolateral and orbitofrontal regions of the prefrontal cortex, posterior brain regions have been shown to be responsible for non-executive abilities like long-term memory, visuospatial abilities, and sensory perception (Giancola, 2000). Tasks that measure executive functions are generally complex and so require input from lower-level cognitive systems in addition to the higher-level executive functions, resulting in 'task impurity' (Jurado & Rosselli, 2007); in order to establish the presence of an executive functioning deficit, one must be able to identify and then rule out the influence of all other non-executive contributions to the task, which is virtually impossible. Accordingly, it can be concluded that some components of the ECF measures used in the present study may have measured other non-executive functions in addition to executive functions, thus threatening the internal validity of the study. One way to deal with this issue has been to remove the modular nature of ECF measures by using a specific test battery like the Delis-Kaplan Executive Function System or the Halstead-Reitan Neuropsychological Battery that has been heavily normed and validated on a standardization sample; further research adopting this methodology is necessary before we can fully classify the association between recidivism and executive deficits in offenders.

Another limitation of this study pertained to the difficulties inherent in conducting research on a forensic population. Within the institutional culture there is a strong

mistrust of those in authority, as well as all things related to psychology, such as psychological tests. The fact that guards, psychologists, and other prison staff helped with the recruitment process may have influenced the type of offender who chose to participate, given that as offenders are incarcerated for longer periods they may become more suspicious of institutional personnel and therefore less likely to participate in activities approved by institutional staff, like research studies. As a result, the offenders who volunteered for the current study may possess characteristics that systematically differentiate themselves from the general population of offenders, and it is unlikely that the current sample is representative of all Canadian incarcerated offenders. Furthermore, offenders' level of motivation throughout the testing may not have remained consistent, thus threatening the internal validity of the study. While the study measures were not particularly taxing, they do require attention and care in order to be completed to the best of one's ability. For offenders who may have been motivated to participate in order to receive benefits like leaving their cell or interacting with a new individual, they may have been insufficiently invested in the task at hand to continue giving an honest effort once the benefits were obtained, resulting in careless responding.

Offender heterogeneity may have also been a limitation of the research. While not discussed in detail, the sample of offenders included both violent and non-violent offenders. Some researchers argue that given the very different presentations between the two groups of offenders, the cognitive mechanism at work are fundamentally different (Hoaken et al., 2007). In support of this claim, Robinson (1995) showed that cognitive skills programs did not decrease recidivism rates of non-violent offenders while decreasing the recidivism rates of violent offenders. As cognitive skills programs target

some of the skills related to executive functioning, such as interpersonal problem solving and self-control, it is conceivable to think that violent offenders' criminal behaviour may be more related to errors in cognition, and therefore deficits in executive functions, than non-violent offenders. By grouping these two categories of offenders together, the offender sample may have been too heterogeneous for any real differences in ECF to be revealed. As discussed earlier, impairments in ECF have been associated with violent offenders, especially those who have committed acts of reactive aggression. Fewer studies, however, have investigated the relationship between impairments in ECF and non-violent offenders (Ross et al., 2008). Future research should take into consideration this classification approach, which may allow for more interpretable results.

Lastly, the small sample size of the current study may have reduced the power to detect the presence of significant results and increased the likelihood of finding ambiguous results. While effort was made to reduce the variables used to measure ECF to only the most necessary, the ratio of participants to ECF variables may have been too small to determine whether an effect was present in the first and second objective. However, given the difficulty of conducting research in a forensic setting, small sample sizes are not unusual in this field (and one could argue that sample sizes of objective one and two are not extraordinarily small,  $n = 54$ ). Due to the fact that this study was primarily exploratory in nature, the obtained sample sizes were deemed acceptable; however future work in this area should strive for a larger sample of participants in order to increase the likelihood of drawing more definitive conclusions.

Some future research directions have been recommended within the discussion of this study, one that has yet to be mentioned is the use of neuroimaging techniques. It is

acknowledged that brain-behaviour relationships are difficult to exclusively define based solely on neuropsychological testing (as in the current study), thus the inclusion of functional imaging techniques would help to further develop the relationship between ECF dysfunction and recidivism. Using techniques such as functional magnetic resonance imaging (fMRI) or positron emission tomography (PET) would help to assess patterns of cortical functioning during executive tasks in offenders who recidivate and those who do not.

### *Summary and Conclusions*

Looking at the state of the literature, it is evident that forensic researchers are still in the process of determining what factors are related to future reoffending behaviour, with the hope that through identifying relevant factors we will be better able to target out remediation programming to address these criminogenic needs and subsequently reduce criminal behaviour. The multitude of variables that have been identified as relating to recidivism have resulted in the development of a great number of remediation programs targeting these risk factors, as well as the identification of several guiding principles (such as offender risk, offender need, and responsivity) that inform the development of effective programming (Andrews, Bonta et al., 1990). And while we have made great strides towards identifying 'what works' for reducing criminal behaviour, the fact remains that these programs are not successful for all offenders, providing an impetus for continued research in this direction.

Unfortunately, the results of the current study were ambiguous; while significant ECF deficits were found among early recidivists on a variety of ECF measures, there were no such deficits detected in institutional non-conformists or recidivists. These

results likely speak to issues in study design and classification, although it is possible that the pattern observed is significant. If it is the case that ECF deficits are only present in early recidivists, this finding would still have great implications for the assessment of risk and development of remediation programming. The sizeable difference in time at risk between the early and late recidivists (less than 5 months as compared to more than 14 months), along with the significant difference in overall executive functioning suggests that deficient ECF plays a role in the timing of offenders' return to institutional custody. If offenders with impaired ECF were identified once they entered the correctional system, it would be possible to dedicate the proper resources to them in order to improve their ECF abilities, hopefully bringing their executive functions to a level more similar to that of late recidivists. Ultimately these offenders may still recidivate, but by increasing the time at risk (in essence, shifting early recidivists into late recidivists), it would allow more time for supportive resources to be put in place, for the effects of programming to be felt, and for positive behavioural changes to be reinforced.

While some remediation programs are beginning to include efforts to improve ECF in their curriculum, these efforts have been haphazard and the degree to which existing correctional programming remediates ECF deficits, if at all, remains uncertain (Ross et al., 2008). In terms of developing a specialized element of ECF training, it has been suggested that forensic researchers look to the field of neuropsychology, specifically the rehabilitation efforts targeting executive abilities of individuals with severe head injury or schizophrenia. In evaluations of a structured training program with modules addressing cognitive differentiation, social perception, communication, and interpersonal problem solving, Penades and colleagues (2003) found significant improvements in



executive functioning abilities. Although current models of correctional remediation programming incorporate similar elements aimed at improving an individual's interpretation of social information, this program had a unique focus on specific functions corresponding to various executive functions such as attentional skills (e.g., selective attention, shifting attention, sustaining focused attention) and conceptualization abilities (e.g., stimuli abstraction, concept discrimination, concept modulation, and concept recall). If current remediation programs were modified to include these elements, offenders with impaired ECF may experience more benefits from programming. Of additional importance is that the researchers found that improvements in executive functions were closely followed by improvements to social functioning, this may be due to improvements in ECF ability affecting both the 'hot' and 'cold' components. The finding that executive function rehabilitation seems to improve not only executive functioning but social functioning as well has been supported by the work of other researchers (Spaulding et al., 1999; Wykes, Reeder, Corner, Williams, & Everitt, 1999); these results suggest that that changes in cognition translate into changes in functional outcome, a reasonable assumption given that there are specific domains of cognition that are related to functional outcome (Green, 1996; Green, Kern, Braff, & Mintz, 2000). Consequently, given the right programming, it is possible to expect that changes in executive functions would lead to improved reduced antisocial behaviour.

Crime impacts the community at multiple levels, causing distress and loss for the victims, and feelings of insecurity for the public, as well as adding to the drain on financial resources of all levels of government. This makes the accurate identification of risk for reoffending and efficacious remediation strategies imperative. While the results

of the current study did not completely support the proposed relationship between executive functions and recidivism, there is enough potential evidenced in the results that this relationship remains a promising research endeavor. Given the possible implications for public policy following less ambiguous results, the benefits of continued research in this area are innumerable. For example, the discovery of a clear distinction in executive abilities between early and late recidivists may aid in the accurate classification of risk for recidivism, which may inform various release and sentencing decisions. While recidivism is multidetermined, the addition of another risk factor to the list of potential criminogenic needs to be targeted in treatment is still of value, especially when considering the social significance of reductions in recidivism.

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## Appendix A: Ethics Approval from the Office of Research Ethics

UNIVERSITY OF WESTERN ONTARIO

OFFICE OF RESEARCH ETHICS

2001



## Office of Research Ethics

The University of Western Ontario  
 Room 02045 Dental Sciences Building, London, ON, Canada N6A 6G1  
 Telephone: (519) 861-3036 Fax: (519) 861-0426 Email: ethics@uwo.ca  
 Website: www.uwo.ca/research/ethics

## Use of Human Subjects - Ethics Approval Notice

Principal Investigator: Dr. P.N.S. Hecker

Review Number: 118128

Revision Number: 1

Protocol Title: The cognitive neuroscience of voluntary executive cognitive function and social perceptual processing capacity of "Real Time", "Long Time", and controls

Department and Institution: Psychology, University of Western Ontario

Sponsor: SSHRC-SOCIAL SCIENCE HUMANITIES RESEARCH COUNCIL

Ethics Approval Date: June 7, 2006

Expiry Date: December 31, 2006

Documents Reviewed and Approved: Revised Study Methods, Revised Study Instruments, Revised Letters of Information &amp; Consent (UWO, Springfield, Pembroke)

## Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (REB) which is organized and operates according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario has granted full board approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable response to the REB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the REB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of other change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the REB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the REB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the REB.

Chief of REB: Dr. Amy Pasquet

Deputy Chief: Susan Hodgson

## Ethics Officer to Contact for Further Information

☒ Ethics Officer (ethics@uwo.ca) ☐ Jovica Sutherland (jsutherland@uwo.ca) ☐ Jennifer McEwen (jmcEwen@uwo.ca)

This is an official document. Please retain the original in your files.

m. d. d. d.

UWO REB Ethics Approval  
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Signed Y. N.

Page 1 of 1

Appendix B: Letter of Information, Fenbrook Institution

Information Sheet

*Project Title*

The Cognitive Neuroscience of Violence: Executive Cognitive Function and Social-Perceptual Processing Capacity of "First Timers," "Long Timer," and Controls

*Principal Investigator*

Peter N.S. Hoaken, Ph.D., Assistant Professor, Department of Psychology, The University of Western Ontario, London, ON, N6A 5C2.

*Invitation to Participate in Research*

You are being invited to participate in a research study conducted by researchers from the University of Western Ontario with the co-operation of the Correctional Service of Canada. Taking part in this study is voluntary and you may withdraw from the study at any time. Withdrawal or participation in this study will not affect the terms of your incarceration, case management plan, or decisions of release. The study is described below. This description tells you what you will be asked to do, and any risks, inconveniences, or discomfort you might experience. Participating in this study will not directly benefit you, but we might learn things that will benefit others. You should discuss any questions you have about this study with the experimenter. This research will take place on-site at Fenbrook Institution, Gravenhurst, ON.

*Purpose of Research*

Some scientists have suggested that violence occurs because the violent individual has problems fully understanding social cues such as body language or facial expression. Scientists are also discovering that difficulties in certain problem-solving and decision-

making skills are related to the likelihood of committing acts of aggression. The purpose of this study is to try to better understand the relationship between the ability to successfully solve puzzles and the ability to correctly understand social interactions. It is hoped that this research may assist scientists in the creation of improved treatment programs for violence. This research project will test a total of 180 participants; 60 at this institution, 60 at a different institution (Springhill Institution, Nova Scotia), and 60 community controls.

#### *Participant Exclusion Criteria*

Any male offender currently incarcerated at Fenbrook Institution may be considered for participation in the study. However, you cannot participate in this study if you currently deny committing an offence, are appealing your conviction, or are considered by the head psychologist of the Fenbrook Institution to be a risk of committing violence during the testing portion of this study. You also may not participate if you do not have normal or corrected-to-normal vision (that is, with glasses or contact lenses).

#### *Description of Research*

If you take part in this study, you will be asked to complete a series of tasks, presented in random order. One of the tasks will be a computerized multiple-choice questionnaire designed to measure general intelligence independent of language and schooling. For example, you will be asked to select the best match to a pattern on the screen.

A task designed to measure strategy and memory will ask you to sort cards into different piles based on trial, error, and the feedback you will receive.

In a separate memory task, you will see six boxes, each with a different shape in it. In another box, you will see a colour. Your job will be to learn, by using trial and error, and then to remember, which colour goes with which shape. In another memory task, you will see twelve figures on the screen. You will point to one of them, and then the pattern will rearrange. Then you will point to a different one, and the screen will rearrange. The idea is to remember which ones you have pointed at and to not point at them again.

Another task, designed to measure complex strategy will begin by presenting to you four decks of cards and 200 points. You will be asked to maximize the number of points you have by selecting cards from the deck of your choice, and you may switch from deck to deck as you wish. Every card selected offers points, which are given after the card is selected, although some cards have penalties. Completion of these tasks should take between an hour and an hour and a half. You will be given a chance to take a break at this point.

After these tasks, you will then be asked to perform a series of tasks in which you have to view pictures of human faces, and judge them for emotional meaning. That is, you will see the face for a short period of time, and then the computer will ask you to indicate whether you think the person was sad, angry, happy, and so on. These tasks will get more complex, and will eventually involve not only judging what emotion is displayed, but using that information to gain reward and/or avoid punishment. Completion of this second part of the study should take another 20 or 30 minutes.

You will also be asked to fill a questionnaire that asks questions about your childhood. Please note that these questions may be upsetting, and that you may stop your



participation at any time. Your participation in this study will take approximately one and a half to two hours total time.

We would also like to review your file information held by the Correctional Service of Canada. This file review will entail access to your Case Management and Psychology files only. The Case Management files will be reviewed to: 1) ascertain whether you are incarcerated for a violent crime; 2) gain demographic information; and 3) gain information as to your history of institutional program involvement, specifically anti-violence programming. Your Psychology file will only be reviewed for the purpose of obtaining your scores on a particular risk assessment test, the PCL-R (if available). Please note that the experimenter will not be reviewing any therapy notes or any other confidential communication you may have had with any member of the Psychology Department.

It is possible that we may wish to conduct follow-up research. That is, we may wish to assess which participants have had successful post-release integration, and which participants have re-offended. This is important because it lets us determine what aspects of programming are effective and which are not. By signing this consent form, you are agreeing that we may access information about your activities post-release.

#### *Potential Harms*

There are no known risks to participating in this study. You may become tired while completing the computer tasks. Please be aware you may take a break at any time.

#### *Possible Benefits*

There are no direct benefits to you for participating in this study, but knowledge may be gained to help people understand the relationship between the ability to solve

complex problems and the ability to correctly understand the meaning of social interactions.

### *Voluntary Participation*

Participation in this study is voluntary. You should only agree to participate if you feel you have been given enough information about the study. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time. Participation in this study, refusing to answer questions, or withdrawal at any time will not have any effect on the terms of your incarceration, case management plan, or decisions of release.

### *Participation in Other Studies*

If you are already participating in another study at this time, you should tell the interviewer right away to decide if it is appropriate for you to participate in this study.

### *Confidentiality*

Any information that you provide us with or that is obtained from your file information is valuable, and we will respect your privacy. Any information reviewed in your file or that you have personally provided to us will be kept confidential. To protect confidentiality, a participant code will be assigned to all documents and information provided by participants. The code is created based on an identifying number and the participant's first initial of their first and last name. For example, John Smith's code number might be 001JS. The only location in which a participant's code and full name are linked is in a computer document that is protected by a password. This document can only be viewed by the Principal Investigator and other approved personnel. Additionally, any personally identifying information (e.g., your name and FPS#) will be removed from

the participant file and placed in a locked cabinet, in a securely locked room, in the Psychology Department at the University of Western Ontario. Thus, at no time will there be any identifying information found in the participant's data file. If the results of the study are published, names will not be used and no information that discloses participant's identity will be released or published. Five years after the study has been completed and the findings published, we will destroy the data you have provided us. Please note that if you would like to receive a copy of the overall results of the study please bring this to the attention of the interviewer, and this will be provided to you when it becomes available (please be aware this may take several months).

The Research Ethics Board at The University of Western Ontario may contact you directly to ask about your participation in the study.

#### *Contact Persons*

If you have any further questions about any aspect of this study, you may contact (at no charge, through the office of Dr. Rowntree): Dr. Peter Hoaken

If you have questions about the conduct of this study or your rights as a research subject, you may contact (at no charge, through the office of Dr. Rowntree): The Director, Office of Research Ethics, The University of Western Ontario, 519-661-3036.

#### *Compensation*

Following the rules of the Correctional Service of Canada, no compensation is provided for participation in this study.

Appendix C: Informed Consent Form, Fenbrook Institution

Consent Form

Project Title: The Cognitive Neuroscience of Violence: Executive Cognitive Function and Social-Perceptual Processing Capacity of "First Timers," "Long Timer," and Controls

By signing below, you are agreeing to the following statement. Please note that you do not waive any legal rights by signing this document. You will be provided with a copy of this letter once it has been signed.

I have read the Information/Consent document, or had it read to me, the nature of the study has been explained to me, and I agree to participate. All questions have been answered to my satisfaction.

- ☐ I give permission for the researcher to access my Case Management and Psychology file to obtain information about my offences, my participation in institutional programs, scores on a risk assessment tool (PCL-R, if available), and demographic information which includes age, handedness, years of education, and former occupation.
  
- ☐ I have been told that because this is a research project, my answers will remain strictly confidential. My answers will not be shared with any correctional staff, and they will not appear in any of my CSC files. I have been told that my name will not be mentioned in any report or publication of the results of the study. Such reports or publications will only mention groups of participants.

☐ My name must be on the consent form, but it will not appear on any of the study material. I have been told that I may withdrawal from the study at any time and that if I do so, my answers will be destroyed. Moreover, I have been told that my decision to participate or not will have no effect for me in the management of my case in the institution.

I give permission for the researcher to access information about my post-release activities.

Yes ☐ No ☐

Participant's Full Name: \_\_\_\_\_

Participant's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Full Name of Person Obtaining Informed Consent: \_\_\_\_\_

Signature of Person Obtaining Informed Consent: \_\_\_\_\_

Date: \_\_\_\_\_

Appendix D: Letter of Information, Springhill Institution

Information Sheet

*Project Title*

The Cognitive Neuroscience of Violence: Executive Cognitive Function and Social-Perceptual Processing Capacity of "First Timers," "Long Timer," and Controls

*Principal Investigator*

Peter N.S. Hoaken, Ph.D., Assistant Professor, Department of Psychology, The University of Western Ontario, London, ON, N6A 5C2.

*Invitation to Participate in Research*

You are being invited to participate in a research study conducted by researchers from the University of Western Ontario with the co-operation of the Correctional Service of Canada. Taking part in this study is voluntary and you may withdraw from the study at any time. Withdrawal or participation in this study will not affect the terms of your incarceration, case management plan, or decisions of release. The study is described below. This description tells you what you will be asked to do, and any risks, inconveniences, or discomfort you might experience. Participating in this study will not directly benefit you, but we might learn things that will benefit others. You should discuss any questions you have about this study with the experimenter. This research will take place on-site at Springhill Institution, Nova Scotia.

*Purpose of Research*

Some scientists have suggested that violence occurs because the violent individual has problems fully understanding social cues such as body language or facial expression. Scientists are also discovering that difficulties in certain problem-solving and decision-

making skills are related to the likelihood of committing acts of aggression. The purpose of this study is to try to better understand the relationship between the ability to successfully solve puzzles and the ability to correctly understand social interactions. It is hoped that this research may assist scientists in the creation of improved treatment programs for violence. This research project will test a total of 180 participants; 60 at this institution, 60 at a different institution (Fenbrook Institution, Gravenhurst, ON), and 60 community controls.

#### *Participant Exclusion Criteria*

Any male offender currently incarcerated at Springhill Institution may be considered for participation in the study. However, you cannot participate in this study if you currently deny committing an offence, are appealing your conviction, or are considered by the head psychologist of the Springhill Institution to be a risk of committing violence during the testing portion of this study. You also may not participate if you do not have normal or corrected-to-normal vision (that is, with glasses or contact lenses).

#### *Description of Research*

If you take part in this study, you will be asked to complete a series of tasks, presented in random order. One of the tasks will be a computerized multiple-choice questionnaire designed to measure general intelligence independent of language and schooling. For example, you will be asked to select the best match to a pattern on the screen.

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In a separate memory task, you will see six boxes, each with a different shape in it. In another box, you will see a colour. Your job will be to learn, by using trial and error, and then to remember, which colour goes with which shape. In another memory task, you will see twelve figures on the screen. You will point to one of them, and then the pattern will rearrange. Then you will point to a different one, and the screen will rearrange. The idea is to remember which ones you have pointed at and to not point at them again.

Another task, designed to measure complex strategy will begin by presenting to you four decks of cards and 200 points. You will be asked to maximize the number of points you have by selecting cards from the deck of your choice, and you may switch from deck to deck as you wish. Every card selected offers points, which are given after the card is selected, although some cards have penalties. Completion of these tasks should take between an hour and an hour and a half. You will be given a chance to take a break at this point.

After these tasks, you will then be asked to perform a series of tasks in which you have to view pictures of human faces, and judge them for emotional meaning. That is, you will see the face for a short period of time, and then the computer will ask you to indicate whether you think the person was sad, angry, happy, and so on. These tasks will get more complex, and will eventually involve not only judging what emotion is displayed, but using that information to gain reward and/or avoid punishment. Completion of this second part of the study should take another 20 or 30 minutes.

You will also be asked to fill a questionnaire that asks questions about your childhood. Please note that these questions may be upsetting, and that you may stop your



participation at any time. Your participation in this study will take approximately one and a half to two hours total time.

We would also like to review your file information held by the Correctional Service of Canada. This file review will entail access to your Case Management and Psychology files only. The Case Management files will be reviewed to: 1) ascertain whether you are incarcerated for a violent crime; 2) gain demographic information; and 3) gain information as to your history of institutional program involvement, specifically anti-violence programming. Your Psychology file will only be reviewed for the purpose of obtaining your scores on a particular risk assessment test, the PCL-R (if available). Please note that the experimenter will not be reviewing any therapy notes or any other confidential communication you may have had with any member of the Psychology Department.

It is possible that we may wish to conduct follow-up research. That is, we may wish to assess which participants have had successful post-release integration, and which participants have re-offended. This is important because it lets us determine what aspects of programming are effective and which are not. By signing this consent form, you are agreeing that we may access information about your activities post-release.

#### *Potential Harms*

There are no known risks to participating in this study. You may become tired while completing the computer tasks. Please be aware you may take a break at any time.

#### *Possible Benefits*

There are no direct benefits to you for participating in this study, but knowledge may be gained to help people understand the relationship between the ability to solve

complex problems and the ability to correctly understand the meaning of social interactions.

### *Voluntary Participation*

Participation in this study is voluntary. You should only agree to participate if you feel you have been given enough information about the study. You may refuse to participate, refuse to answer any questions, or withdraw from the study at any time.

Participation in this study, refusing to answer questions, or withdrawal at any time will not have any effect on the terms of your incarceration, case management plan, or decisions of release.

### *Participation in Other Studies*

If you are already participating in another study at this time, you should tell the interviewer right away to decide if it is appropriate for you to participate in this study.

### *Confidentiality*

Any information that you provide us with or that is obtained from your file information is valuable, and we will respect your privacy. Any information reviewed in your file or that you have personally provided to us will be kept confidential. To protect confidentiality, a participant code will be assigned to all documents and information provided by participants. The code is created based on an identifying number and the participant's first initial of their first and last name. For example, John Smith's code number might be 001JS. The only location in which a participant's code and full name are linked is in a computer document that is protected by a password. This document can only be viewed by the Principal Investigator and other approved personnel. Additionally, any personally identifying information (e.g., your name and FPS#) will be removed from

the participant file and placed in a locked cabinet, in a securely locked room, in the Psychology Department at the University of Western Ontario. Thus, at no time will there be any identifying information found in the participant's data file. If the results of the study are published, names will not be used and no information that discloses participant's identity will be released or published. Five years after the study has been completed and the findings published, we will destroy the data you have provided us. Please note that if you would like to receive a copy of the overall results of the study please bring this to the attention of the interviewer, and this will be provided to you when it becomes available (please be aware this may take several months).

The Research Ethics Board at The University of Western Ontario may contact you directly to ask about your participation in the study.

#### *Contact Persons*

If you have any further questions about any aspect of this study, you may contact (at no charge, through the office of Dr. Earle): Dr. Peter Hoaken

If you have questions about the conduct of this study or your rights as a research subject, you may contact (at no charge, through the office of Dr. Earle): The Director, Office of Research Ethics, The University of Western Ontario, 519-661-3036.

#### *Compensation*

Following the rules of the Correctional Service of Canada, no compensation is provided for participation in this study.

Appendix E: Informed Consent Form, Springhill Institution

Consent Form

Project Title: The Cognitive Neuroscience of Violence: Executive Cognitive Function and Social-Perceptual Processing Capacity of "First Timers," "Long Timer," and Controls

By signing below, you are agreeing to the following statement. Please note that you do not waive any legal rights by signing this document. You will be provided with a copy of this letter once it has been signed.

I have read the Information/Consent document, or had it read to me, the nature of the study has been explained to me, and I agree to participate. All questions have been answered to my satisfaction.

☐ I give permission for the researcher to access my Case Management and Psychology file to obtain information about my offences, my participation in institutional programs, scores on a risk assessment tool (PCL-R, if available), and demographic information which includes age, handedness, years of education, and former occupation.

☐ I have been told that because this is a research project, my answers will remain strictly confidential. My answers will not be shared with any correctional staff, and they will not appear in any of my CSC files. I have been told that my name will not be mentioned in any report or publication of the results of the study. Such reports or publications will only mention groups of participants.

☐ My name must be on the consent form, but it will not appear on any of the study material. I have been told that I may withdrawal from the study at any time and that if I do so, my answers will be destroyed. Moreover, I have been told that my decision to participate or not will have no effect for me in the management of my case in the institution.

I give permission for the researcher to access information about my post-release activities.

Yes ☐ No ☐

Participant's Full Name: \_\_\_\_\_

Participant's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Full Name of Person Obtaining Informed Consent: \_\_\_\_\_

Signature of Person Obtaining Informed Consent: \_\_\_\_\_

Date: \_\_\_\_\_