A COMPREHENSIVE TYPOLOGY OF SUBSTANCE MISUSING OFFENDERS: TOWARDS AN UNDERSTANDING OF OFFENDER DIVERSITY

by

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Abstract

The rates of substance use disorders (SUDs) are higher in offenders than in the general population. The Substance Use Risk Profile (SURP) model posits that there are four personality vulnerability subtypes associated with distinct patterns of substance misuse and comorbid psychopathology, including: impulsivity, sensation seeking, anxiety sensitivity, and introversion/hopelessness. Interventions matched to these personality vulnerability subtypes have been found to be effective for reducing substance use behaviours and symptoms of comorbid psychopathology. However, this model, which was developed with female substance misusers and replicated only in high school students, lacks validation in an offender population. Therefore, the first goal of this dissertation was to validate the SURP personality model in male offenders. Furthermore, this dissertation assessed whether the SURP model could postdict self-reported institutional substance use (i.e., illicit substance use or misuse of prescription medication while incarcerated). Finally, this dissertation advanced the theoretical understanding of the relationship between SUDs and criminal behaviour by examining the link between the SURP personality variables and behavioural indicators of both substance misuse and antisocial personality disorder. The SURP model did not replicate as expected, as offenders were clustered based on varying degrees of the severity of their substance use, mental health comorbidity, and global elevations in personality vulnerabilities. Specifically, the latent class cluster analysis revealed the presence of three distinct clusters, characterized by low, moderate, and high elevations in personality traits and substance misuse. Survival analysis revealed a trend for cluster membership to predict survival time before engaging in institutional substance misuse. Specifically, high levels of sensation seeking and a trend towards low levels of anxiety sensitivity postdicted

shorter times to engaging in institutional substance use. Finally, canonical correlations revealed that high impulsivity, introversion/hopelessness, and sensation seeking were linked to higher levels of antisociality, drug and alcohol dependence, self-rated substance use severity, criminal versatility, and younger ages of first use and first arrest. Moreover, low AS was linked to increased criminal versatility and a reduced frequency of drug arrests. These findings emphasize the role that certain personality characteristics play in substance use and criminal behaviour and the need to target these in correctional programs.

DEDICATION

To Michelle, for editing each and every piece of undergraduate and graduate writing (except for this dedication), ten amazing years together, and freezerfulls of food. You've made me the envy of grad students everywhere (or at least at UNB). Without you I would not have made it this far.

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1. Introduction

1.1 Defining Substance Use Disorders

In the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV-TR), substance use disorders (SUDs) consisted of two general diagnoses: substance abuse and the more severe diagnosis of substance dependence (American Psychiatric Association [APA], 2000). The recently released DSM-5 (APA, 2013) revised the categorization of substance-related disorders into a single diagnostic category of SUDs that is measured on a continuum ranging from mild to severe. Specifically, a mild disorder is characterized by two or three symptoms, a moderate disorder by four or five symptoms, and severe if six or more symptoms are present. The current DSM-5 criteria include a problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period: (1) substance is often taken in larger amounts or over a longer period than was intended; (2) there is a persistent desire or unsuccessful efforts to bring down or control substance use; (3) a great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects; (4) craving, or a strong desire or urge to use the substance; (5) recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home; (6) continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance; (7) important social, occupational, or recreational activities are given up or reduced because of substance use; (8) recurrent substance use in situations in which it is physically hazardous; (9) substance use is continued despite knowledge of having a persistent or

recurrent physical or psychological problem that is likely to have been caused or exacerbated by use of the substance; (10) tolerance as defined by either of the following: (A) a need for markedly increased amounts of the substance to achieve intoxication or the desired effect; or (B) a markedly diminished effect with continued use of the same amount of the substance; (11) withdrawal, as manifested by either of the following: (A) the characteristic withdrawal syndrome for the substance; or (B) the substance or a closely related substance is taken to relieve or avoid withdrawal symptoms. A comparison of DSM-IV-TR to DSM-5 symptoms reveals the addition of drug craving as a symptom, whereas legal problems associated with substance use was eliminated in the most recent DSM iteration. Furthermore, a diagnosis of a SUD is possible for both licit (e.g., alcohol) and illicit drugs (e.g., cocaine, cannabis). Specifically, this diagnosis exists for nine separate classes of drugs, namely: alcohol, caffeine, cannabis, hallucinogens (phencyclidine and other), inhalants, opioids, sedatives (hypnotics or anxiolytics), stimulants, and tobacco.

The course of substance misuse tends to be chronic, cycling between remission and periods of exacerbated use (APA, 2000; APA 2013). Substance misuse is frequently divided into either alcohol or drug use, with drugs being separated into various classes based on their pharmacological effects (Agrawal, Lynskey, Madden, Bucholz, & Heath, 2006; Lightfoot & Hodgins, 1993; McKim, 2007; Welte, Zhang, & Wieczorek, 2001).

1.2 The Pharmacological Effects of Substances

Substances have a variety of effects which will be reviewed in detail below. The diverse neurobiological effects of substances are also associated with their reported subjective response (i.e., anxiety reducing, stimulating) and contribute to the onset and

maintenance of substance use behaviours. In this section, the neurotransmitter systems and related neuropsychological functions affected by various types of substances will be discussed. Table 1 provides a summary of this information.

Neuropharmacologically, alcohol (Half-life ($t_{1/2}$) = 10-20mg of alcohol/100ml of blood per hour) is known to act on various brain systems, which explains the diverse alcohol-induced behavioural responses that can be experienced (McKim, 2007). First, alcohol depresses functioning of glutamate by blocking N-methyl-D-aspartate receptors of glutamate, which are partly responsible for memory functioning (Fei & Tsien, 2009). Consequently, glutamate is up-regulated to compensate for this decrease (Fei & Tsien, 2009; Lewis, 1996). Second, alcohol acts as an agonist (i.e., engenders a biological response after binding to receptors) of the gamma-aminobutyric acid (GABA) A receptor. Given the inhibitory nature of the GABAergic system, this agonistic effect results in increased relaxation and sedation (Lewis, 1996). Importantly, alcohol increases the functioning of one serotonin receptor (5-HT_3) involved in the release of dopamine in the nucleus accumbens (Lewis, 1996). The resulting dopamine increase is partly responsible for the reinforcing effects of alcohol (Lewis, 1996). The ascending limb of blood alcohol curve (i.e., when blood alcohol concentrations are rising) is associated with stimulating effects, whereas sedation occurs most commonly on the descending limb of the blood alcohol curve (i.e., when blood alcohol concentrations are decreasing; McKim, 2007). Alcohol is also known to negatively affect perception, reaction time, memory and behavioural control (McKim, 2007).

Sedatives, such as barbiturates (e.g., Phenobarbital; $t_{1/2}$ = 92 hours) and benzodiazepines (e.g., Valium, Rohypnol; $t_{1/2}$ = 27-48 hours), are

neuropharmacologically similar to alcohol, in that the primary effects of these substances are on the $GABA_A$ receptor sites (Chen, de Haas, de Kam, & van Gerven, 2011). However, sedatives and tranquilizers act on different subunits of $GABA_A$ than alcohol (McKim, 2007). Contrary to alcohol, this class of drug inhibits dopamine activity in the nucleus accumbens (McKim, 2007). However, reinforcement is still possible via the GABAergic system in the nucleus accumbens (McKim, 2007). Sedatives have anxiolytic properties and are used to treat anxiety disorders, insomnia and act as muscle relaxants (Chen et al., 2011). Typical subjective effects include euphoria and fatigue. However, in high doses, sedative use causes diminished levels of attention and explicit memory, and potentially results in anterograde amnesia (Chen et al., 2011). Although overdose on sedatives alone is rarely fatal, using sedatives in combination with alcohol can result in death, due to their synergistic effects on the cardiovascular and respiratory systems (Saunders, Von Korff, Campbell, Banta-Green, Sullivan, Merrill, & Weisner, 2012).

Although solvents and inhalants (e.g., gasoline, aerosols, ether, nitrous oxide; $t_{1/2}$ = 90 seconds) are grouped together based on route of administration, their neuropharmacological effects are varied (Kielbasa & Fung, 2000; McKim, 2007). In general, solvents and inhalants function via enhancement of GABA, glycine, and antagonizing (i.e., blocking) the N-methyl-D-aspartate receptor of glutamate (O'Leary-Moore et al., 2009). The rewarding effects of substances in this category are maintained through enhancement of the GABAergic system, resulting in increased activity of dopamine (McKim, 2007). Initial intoxication results in exhilaration. If intoxication is continued, slurred speech, disorientation and hallucinations are common. Coma,

seizures and death are possible in cases of extreme intoxication (Beckley & Woodward, 2011; McKim, 2007). Performance tends to be impaired on tasks involving memory and fine motor skills (Zancy, Janiszewski, Sedeghi & Black, 1999). The subjective and performance effects are potentiated by the use of alcohol and sedatives (McKim, 2007).

Stimulants, such as amphetamines ($t_{1/2}$ = 7-34 hours) or cocaine, ($t_{1/2}$ = ~40 minutes) derive their effects by stimulating a combination of monoamines; a class of neurotransmitters made up of epinephrine, norepinephrine, dopamine, and 5-HT (McKim, 2007; Vezina, 2004). Cocaine blocks reuptake of these neurotransmitters, whereas amphetamines also block reuptake and cause leakage of the neurotransmitters into the synaptic cleft and directly increase the amount of the neurotransmitters released after an action potential (Vezina, 2004). Notably, stimulant use results in the release of dopamine in the nucleus accumbens, which is part of the mesolimbic dopaminergic reward pathway, and increases motivational salience and reward for use (Vezina, 2004; Wolf, Sun, Mangiavacchi, & Chao, 2004). Subjective effects typically include euphoria (known as a rush), high energy and an increase in goal driven behaviour (Wolf et al., 2004). However, excessive doses of stimulants can result in auditory and visual hallucinations, lasting several days (McKim, 2007). Overdose can result in the depression of the respiratory system paired with severe muscle weakness, convulsions and heart failure (McKim, 2007). The interactive effect of stimulants and alcohol includes potentiated euphoria paired with an increased risk for sudden death due to the cumulative demands to the cardiorespiratory system (McKim, 2007).

Narcotics, also known as opioids, include various substances that range from heroin ($t_{1/2}$ = 2-6 minutes) to analgesic prescription drugs, such as: morphine ($t_{1/2}$ = 2

hours), methadone ($t_{1/2}$ = 10-25 hours), and Oxycontin ($t_{1/2}$ = 3-5 hours; McKim, 2007). Opioids act on the endogenous receptors used by endorphins (McKim, 2007). One concentrated area of opioid receptors is in the periaqueductal gray, which controls pain perceptions (Martin, Hurley, & Taber, 2007). When this area is activated, subjective feelings of pain are reduced. Opioids also stimulate receptors in the limbic system to reduce the emotional aspect of pain (Martin et al., 2007). Subjective effects consist of vivid daydreams, somnolence and euphoria (McKim, 2007). However, this euphoria is brief in duration due to rapid development of tolerance (Curran, Kleckham, Bearn, Strang, & Wanigaratne, 2001). Opiate dependence also has been associated with deficits in decision making, strategic planning, and cognitive inhibition (Ersche & Sahakian, 2007; Passetti, Clark, Mehta, Joyce, & King, 2008). Withdrawal from opiates is typically extremely uncomfortable, though never fatal, as can be the case with alcohol (Martin et al., 2007). Overdose of opiates results in depression of the respiratory system, which can arrest breathing (Saunders et al., 2012). When opiates interact with alcohol, the result is an increase in sedation, a reduction in gross motor coordination, and increased risk of central nervous system depression (e.g., respiratory failure, coma; McKim, 2007). Combined use with stimulants may lead to increased euphoria and analgesia and decreased sedation, but incremental risk for respiratory failure (McKim, 2007).

The final class of substances are hallucinogens. These substances, such as lysergic acid diethylamide (LSD; $t_{1/2}$ = 5 hours) and mescaline ($t_{1/2}$ = ~110 minutes) act as agonists of 5-HT receptors in the cortex and locus coeruleus, which is both a primary site for norepinephrine synthesis and is involved in the emotional processing of pain and

stress (Glennon, 2008; McKim, 2007; Papac & Foltz, 1990). Effects in the cortex include prolonging excitation of the glutaminergic system, which stimulates numerous systems. Conversely, hallucinogens suppress output in the locus coeruleus, which results in altered emotion and novelty processing (Glennon, 2008). This altered novelty processing results in the perception of previously seen stimuli as new and unique (Glennon, 2008). Use of these drugs results in vivid hallucinations lasting approximately four hours, during which experiences are interpreted to be emotionally significant and can lead to self-insight (Johnson, MacLean, Reissig, Prisinzano, & Griffiths, 2011). Hallucinogens typically decrease the stimulating effects of alcohol (McKim, 2007). Tolerance to hallucinogens both develops and dissipates quickly (McKim, 2007). Further, no symptoms of withdrawal have been noted, nor are the majority of these drugs toxic, given that there are no recorded cases of overdose, with one exception (Glennon, 2008). The exception is Ecstasy ($t_{1/2}$ = ~8 hours), a cross between a hallucinogen and an amphetamine, which can result in potentially irreversible depletion of serotonin that is directly proportional to the frequency and quantity of use (McKim, 2007; Mugele, Nanagas, Tornoehlen, 2012). This may result in chronic insomnia, depression, anxiety and impulsivity (Wilson, Rooney, Baugh, & Millington, 2012). Ecstasy also prevents heat regulation, which may result in dehydration or damage to various internal organs and potentially death (Wilson et al., 2012).

The heterogeneity in the neuropharmacological properties of psychoactive substances and the resulting subjective effects has been clearly established. However, a better understanding of the various pathways which may lead to substance misuse is necessary. The subsequent literature review will present the current state of knowledge

on the etiological roots of addiction in both the general population and among correctional offenders and provide the impetus for the proposed dissertation.

Table 1

Classes of Substances, Neurotransmitter System Involvement, and Effects on Neuropsychological Functions

Classes	Neurotransmitter Systems	Associated Functions
Alcohol	Glutamate (excitatory) GABA (inhibitory) 5-HT (inhibitory & excitatory) Dopamine (excitatory)	Learning & memory Reduction of excitability in neurons Circadian rhythm, arousal, & mood Reward, motivation, & arousal
Sedatives	GABA (inhibitory)	Reduction of excitability in neurons
Solvents & Inhalants	GABA (inhibitory) Glycine (inhibitory) Glutamate (excitatory)	Regulation of excitability in neurons Movement, learning, & memory Learning & memory
Stimulants	Epinephrine (excitatory) Norepinephrine (excitatory) Dopamine (excitatory) 5-HT (excitatory)	Metabolism, arousal, & attention Arousal, attention, & reward Reward, motivation, & arousal Circadian rhythm, arousal, & mood
Opioids	Endogenous Opioids (inhibitory)	Modulate emotion & physical pain
Hallucinogens	5-HT (excitatory) Glutamate (excitatory)	Circadian rhythm, arousal, & mood Learning & memory

2. Literature Review

2.1 The Prevalence of SUDs in the General Population

SUDs are amongst the most common mental disorder diagnoses in North America (Currie et al., 2005). The National Comorbidity Survey examined the prevalence and patterns of comorbidity of mental health disorders in individuals aged 15-54 years old in the United States, with an overall sample size of over 8,000 respondents (Anthony, Warner, & Kessler, 1994). The authors noted that approximately 14% of the sample met the previous DSM-III diagnostic criteria for lifetime alcohol dependence and 7.5% for drug dependence, with the highest prevalence among younger males. Pertaining to Canada, a recent study based on data from the Canadian Community Health Survey indicated that approximately 2.6% of Canadian adults in the community met DSM-IV criteria for past year alcohol dependence, while 0.8% met DSM-IV criteria for past year drug dependence (Veldhuizen, Urbanoski, & Cairney, 2007). The 12-month point prevalence of substance use problems was estimated to be 11%, with the lowest rates in Ontario and Quebec, and the highest in British Columbia and Saskatchewan (Veldhuizen et al., 2007). Overall, it has been estimated that a lifetime SUD diagnosis affects approximately 21% of Canadians (Pearson, Janz, & Ali, 2013). Specifically, the lifetime prevalence of alcohol use disorders (i.e., abuse or dependence) was estimated at 18%, whereas the lifetime prevalence of illicit drug use disorders was estimated at 4% (Pearson et al., 2013).

The updated National Comorbidity Survey allowed for the exploration of lifetime prevalence of SUDS in comparison to other mental health disorders (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005). SUDs were the fourth most

commonly diagnosed class of disorders, with a lifetime prevalence of 14.6%. If categorized by disorder, alcohol abuse is the second most common disorder (13.2%) after major depression, followed by specific and social phobias, impulse-control disorders (e.g., conduct disorder, oppositional-defiant disorder, attention deficit/hyperactivity disorder) and drug abuse (7.9%). Conversely, the rates of lifetime dependence are about half those of abuse diagnoses and have declined by half since the initial National Comorbidity Survey (5.4% for alcohol dependence and 3% for drug dependence; Kessler et al., 2005). In sum, these studies indicate that SUDs continue to affect a significant proportion of the population. Furthermore, the costs associated with alcohol and substance misuse are staggering despite overall reductions across time.

2.2 The Health, Societal, and Economic Costs of Substance Misuse

2.2.1 Health costs. Substance misuse is associated with a variety of health-related consequences. The typical impact of sustained substance use involves degeneration in physical health (e.g., heart disease, diabetes), possible infection with communicable diseases, and even sudden death (e.g., overdose; APA, 2000; Smetanin, Stiff, Briante, Adair, Ahmad, & Khan, 2011; Strang et al., 1998). Nietert, French, Kirchner, and Booth (2007) noted that causal links exist between substance use and severe medical conditions, such as cancer, cardiovascular conditions, cirrhosis of the liver, neurological conditions (e.g., Korsakoff's syndrome) and associated injuries (e.g., motor vehicle accidents). In Canada, approximately 21% of all deaths per year are directly linked to substance abuse (Smetanin et al., 2011). Indeed, alcohol, marijuana and cigarette use is commonly associated with respiratory and cardiovascular diseases, in addition to cancer (Brook, Saar, Zhang, & Brook, 2009). Substance abuse service

users are more likely to present with poorer physical (i.e., chronic medical conditions) and mental health conditions (i.e., depression, panic disorder) and use more prescription medications compared to non-problematic users (Nietert et al., 2007). Physical health consequences are also associated with route of administration, as drug users who inject are more likely to contract a blood-borne illness such as HIV and hepatitis (Strang et al., 1998). Injection is also associated with an increased risk for developing drug dependence and overdose (Strang et al., 1998).

2.2.2 Societal costs. In addition to the physical health costs associated with substance use, SUDs have a societal impact. Substance use negatively affects the individual's life, including direct (e.g., health care, social services, crime), indirect (e.g., work productivity, lost production due to mortality before age 65, incarceration), and intangible (i.e., quality of life indices such as: pain, distress, and death) costs at a societal and individual level (Jarl et al., 2008). This is measured via estimates of adverse effects directly and indirectly impacting individuals (Jarl et al., 2008). Alcohol consumption has led to an estimated loss of nearly 28,000 potential life years (i.e., life expectancy) in the Swedish population (Jarl et al., 2008). If intangible quality of life indices were quantified, this would correspond to an estimated cost of between $507 and $605 per capita, on an annual basis (Jarl et al., 2008). Substance misuse also has been associated with the loss of significant relationships (APA, 2000; Laslett, Room, Ferris, Wilkinson, Livingston, & Mugavin, 2011). In addition to the negative ramifications to the misusers themselves, SUDs have negative repercussions on those who surround the individual with a SUD. In a national examination of the impact of drinking on others in Australia, 51% of respondents reported severe adverse effects related to the drinking

behaviours of another individual, including social isolation, stigma, physical or emotional abuse and fear, and young adults reported being the most severely impacted (Babor, 2011; Laslett et al., 2011). Substance dependence also has been tied to criminal behaviour (APA, 2000; Brochu, Cousineau, Gillet, Cournoyer, Pernanen, & Motiuk, 2001; Fazel, Bains, & Doll, 2006; Grant, 2009; Gumpert, Winerdal, Grundtman, Berman, Kristiansson, & Palmstierna, 2010; Jarl et al., 2008; Peters, 1993). Indirectly, the lifestyle associated with illicit substance use (e.g., involvement in crime) can result in intangible costs to victims, such as in changes in behaviours, lowered quality of life and negatively altered views of society (Dolan & Peasgood, 2007).

2.2.3 Economic costs. The economic impact associated with substance misuse is astonishing, with estimates ranging from $180.9 to $184.6 billion in annual expenditures related to alcohol and drug abuse in the United States (Harwood, 2000; Harwood & Bouchery, 2004). These costs capture speciality alcohol services, alcohol abuse treatment and prevention, medical consequences (including fetal alcohol syndrome), lost earnings due to alcohol-related illness or death, and lost earnings due to fetal alcohol syndrome, crime, and the criminal justice system (Harwood, 2000). In the United States, work absenteeism related to alcohol and drug use and related illnesses is estimated to cost between $68 and $86 billion dollars a year out of the aforementioned total estimates (Harwood, 2000). Problematic drug users, compared to recreational users, are less likely to be employed on a full-time basis, earn less legal income (but more illegal income) and visit hospital emergency rooms with greater frequency over a year (French, Roebuck, McGeary, Chitwood, & McCoy, 2001). These United States estimates have remained stable over time (Rehm, Mather, Popova, Thavorncharoensap,

Teerawattananon, & Patra, 2009; U.S. Department of Health and Human Services, 2009). In Canada, the economic price tag of substance abuse is estimated at nearly $40 billion per annum, which averages out to an annual cost of $1,267 to each Canadian citizen (Rehm et al., 2006). This is sub-divided into tobacco ($17 billion), alcohol ($14.6 billion) and illicit drugs ($8.2 billion). Interestingly, Smetanin and colleagues (2011) posit that due to an aging population, rates of substance use disorders are expected to drop by 2041, potentially decreasing the total economic cost to Canadians.

2.3 Comorbidity

Mental illness is frequently comorbid with SUDs in both the general population and in clinical populations (Conrod & Stewart, 2005; de Graff, Bijl, Spijker, Beekman, & Vollebergh, 2003; Langas, Malt, & Opjordsmoen, 2011; Siegfried, 1998). Overall, Smetanin and colleagues (2011) noted that approximately 50% of individuals with a diagnosed mental health disorder have a second mental health condition. The following section will review the frequency at which SUDs are found to co-occur with various psychological conditions, including schizophrenia and bipolar disorder, mood and anxiety disorders, as well as personality disorders.

The prevalence rates of SUDs co-occurring with schizophrenia and bipolar disorder is high (Compton, Thomas, Stinson, & Grant, 2007; Mitchell, Brown, & Rush, 2007; Regier et al., 1990; Thornton, Baker, Johnson, Kay-Lambkin, & Lewin, 2011). Approximately 50% of individuals with these disorders have a SUD (Bennett, Bellack, & Gearon, 2006; Horsfall, Cleary, Hunt, & Walter, 2009; Rach, Beisel, Scott, & Dixon, 1999; Smetanin et al., 2011; Thornton et al., 2011). Specifically, individuals with bipolar disorder exhibit a 41% prevalence rate for drug use disorders and up to 60% for

any substance use disorder (Bennett et al., 2006; Smetanin et al., 2011). Comparatively, the prevalence of alcohol abuse is three times greater, and the prevalence of drug abuse is six times greater, among those diagnosed with schizophrenia than in the general population (Bennett et al., 2006; Horsfall et al., 2009). In addition, between 20-65% of individuals with schizophrenia are estimated to suffer from polysubstance dependence (Bennett et al., 2006). In fact, individuals with schizophrenia have higher prevalence rates for all substances, except for alcohol and heroin, compared to those with a mood or an anxiety disorder (Martins & Gorelick, 2011). Conversely, the risk of developing schizophrenia has been found to be approximately three to four times greater among heavy cannabis users than among nonusers (Andréasson, Allebeck, & Rydberg, 1989; Gerra & Zaimovic, 2002). In addition, the lifetime prevalence rate of schizophrenia is 3.8% among individuals with a diagnosis of alcohol abuse or dependence and 6.8% in individuals with a drug abuse or dependence diagnosis (Regier et al., 1990). Prevalence rates of bipolar disorder among those with alcohol abuse or dependence was 2.3%, whereas approximately 4% of individuals who met criteria for drug abuse or dependence had bipolar disorder (Kessler, Rubinow, Holmes, Abelson, & Zhao, 1997). Finally, 1.7% of individuals with any form of alcohol or drug abuse or dependence met criteria for bipolar disorder (Kessler et al., 1997). Therefore, schizophrenia and bipolar disorder are more likely to be comorbid with various forms of SUD compared to other mental health diagnoses (Rush et al., 2008).

Anxiety disorders are frequently comorbid with substance misuse (Smetanin et al., 2011). The prevalence of any anxiety disorder among those with alcohol use disorders ranges from 23-68%, with a median of 44% (de Graff et al., 2003; Kushner et

al., 1990). In a Canadian sample, rates of 12-month alcohol use problems are estimated to be 26% for men and 10% for women and the 12-month prevalence of drug use problems are estimated at 15% for men and 9% for women (Rush et al., 2008). Therefore, across substances and gender, 12-month estimates of substance use disorders among individuals with an anxiety disorder is currently 21% (Rush et al., 2008). Conversely, among individuals with an alcohol problem, 6% of males and 12% of females have a 12-month prevalence rate of an anxiety disorder (8% overall; Rush et al., 2008). Among individuals with a drug use problem, 12% of males and 19% of females have a 12-month prevalence rates of a mood disorder (14.5% overall; Rush et al., 2008). Specifically, the prevalence of panic disorder among alcohol misusers has ranged as high as 42%, whereas only 1.7% of individuals dependent on cocaine report panic disorder (Kushner, Sher, & Beitman, 1990; Langas et al., 2011). Furthermore, among alcohol-disordered samples, the presence of agoraphobia ranges from 2-42%, simple phobia from 6-17%, social phobia from 2-57%, obsessive compulsive disorder from 3-12%, and generalized anxiety disorder from 8-52% (Conrod & Stewart, 2005; Kushner et al., 1990). With a median rate of 23%, generalized anxiety disorder is the most common form of anxiety disorder in individuals with problematic alcohol use (Conrod & Stewart, 2005; Kushner et al., 1990). However, this estimate may be inflated as several symptoms of generalized anxiety disorder overlap with withdrawal from alcohol use (Langas et al., 2011). The prevalence rates of posttraumatic stress disorder are approximately three times more common among those with SUDs relative to members of the general population (Conrod & Stewart, 2005). From the anxiety disorders perspective, findings from the United States National Epidemiologic Survey on Alcohol

and Related Conditions revealed that among those with anxiety disorders, 22.2% met criteria for alcohol abuse and 3.2% for drug abuse (Martins & Gorelick, 2011). However, alcohol dependence was less frequent, with only 1.7% meeting diagnostic criteria, and drug dependence was present in only 1.3% of those suffering from an anxiety disorder (Martins & Gorelick, 2011).

The results of the Canadian Community Health Survey, the first national epidemiological study that assessed comorbidity in Canada, revealed a similar pattern for mood disorders to that found for anxiety disorders (Currie et al., 2005; Smetanin et al., 2011). The occurrence of SUDs was found to be more common among those with a lifetime prevalence of major depressive disorder (4.8%) than those with no history of depression (2.9%; Currie et al., 2005). Canadian males with a mood disorder have higher rates of 12-month alcohol problems (27%), drug use problems (15%) compared to women with alcohol (15%) and drug (10%; Rush et al., 2008) problems. Across gender, rates of substance use problems overall are similar for individuals with mood disorders (22%) compared to anxiety disorders (21%; Rush et al., 2008). Conversely, among individuals with an alcohol problem, 8% of males and 14% of females have a 12-month prevalence rate of a mood disorder (9.6% overall; Rush et al., 2008). Among individuals with a drug problem, 15% of males and 23% of females have a 12-month prevalence rate of a mood disorder (17.5% overall; Rush et al., 2008). In addition, those with a SUD possessed a threefold increase in risk for depression and fourfold increase in suicidal ideation (Currie et al., 2005; Nock, Hwang, Sampson, & Kessler, 2010). Among alcohol dependent cases, rates of depression ranged from 6-11%, whereas rates ranged from 10-22% among drug dependent cases (Currie et al., 2005). Conversely, among

those with a mood disorder, alcohol abuse was present in 21.9% of individuals, and drug abuse was present in 1.6% of those with depression (Martins & Gorelick, 2011). Thus, not only is alcohol misuse common in depressed individuals, but individuals with drug dependence have high rates of comorbid depression as well.

The relationship between SUDs and certain personality disorders is also worth noting. The disorders most commonly associated with SUDs are antisocial and borderline personality disorders (Reedy & Hall, 2008; Regier et al., 1990; Rush et al., 2008). In fact, the rates of comorbidity between SUDs and personality disorder diagnoses are greater than chance with an estimated rate falling between twofold and twenty-fivefold (Compton, Cottler, Phelps, Abdallah, & Spitznagel, 2000). The co-occurrence of these disorders is not unexpected, as the diagnostic criteria for both of these personality disorders contain items related to substance abuse (APA, 2013). Rates of antisocial personality disorder among individuals seeking treatment for drug dependence were found to be 44%, whereas rates of substance misuse ranged from 42-95% in those with antisocial personality disorder (Compton et al., 2000; Regier et al., 1990). Canadian individuals with an alcohol use disorder were three times more likely to meet criteria for a personality disorder than those without, approximately two and a half times more likely with a hallucinogen use disorder, and two times more likely with a cannabis or cocaine use disorder (Rush et al., 2008). Conversely, among those with borderline personality disorder, SUDs are common and have been found in up to 84% in some samples, with a median of 65% (Dulit, Fyer, Haas, Sullivan, & Frances, 1990; Zanarini, Frankenbur, Weingeroff, Reich, Fitzmaurice, & Weiss, 2011). Specifically, alcohol misuse rates in this population range from 24-66%, and 19-87% of individuals

with borderline personality disorder report drug misuse (Zanarini et al., 2011). Rates of SUDs also have been found to be higher among patients with borderline personality disorder than in individuals with other types of personality disorders (Zanarini et al., 2011). In summary, these figures highlight an inflated rate of mental disorders when substance misuse is present, raising the question as to whether underlying mechanisms may account for this relationship.

2.3.1 Theories of interaction between SUDs and other mental health diagnoses. Several theoretical models have attempted to conceptualize the relationship between mental disorders and SUDs (Conrod & Stewart, 2005; Mueser, Drake, & Wallach, 1998; Neale & Kendler, 1995). The four most commonly hypothesized models will be examined in the following section.

2.3.1.1 Secondary Psychiatric Disorder model. The first model of comorbidity posits that SUDs may cause other mental illnesses (Conrod & Stewart, 2005; Meuser et al., 1998; Neale & Kendler, 1995). Therefore, it logically follows that treatment of underlying SUDs will alleviate any mental health symptoms. In support of this perspective, alcohol dependence has been shown to partly precipitate panic disorder (Baillie et al., 2010; Grant et al., 2005). However, contrary evidence to this model exists, as several psychological symptoms do not abate after SUD treatment and not all patients with panic disorder have a SUD. Symptoms of posttraumatic stress disorder persist even after substance abuse treatment (Ouimette, Ahrens, Moos, & Finney, 1998), with a similar pattern present with depression (Greenfield, Venner, Kelly, Slaymaker, & Bryan, 2012). In addition, pre-treatment alcohol use is not linked to treatment outcome for panic disorder and social phobia (McEvoy & Shand, 2008). Finally, it is typically

accepted as empirical consensus that alcohol abuse cannot directly cause severe mental illness (i.e., schizophrenia and bipolar disorder), severely limiting this model (Mueser et al., 1998). Thus, the Secondary Psychiatric Disorder model is insufficient as an explanation for dual diagnoses.

2.3.1.2 Secondary Substance Use Disorders model. The Secondary Substance Use Disorder model is reciprocal to the first, whereby symptoms of mental illness are argued to precipitate, exacerbate or sustain SUDs (Conrod & Stewart, 2005; Mueser et al., 1998; Neale & Kendler, 1995). The theory that individuals with a mental illness self-medicate their symptoms with substances is classified under this model. Consequently, treatment under this model should emphasize reductions in psychiatric symptomatology in order to reduce SUDs. This view is supported by the findings that depression (Hodgins, el-Guebaly, & Armstrong, 1995), psychosocial stress (Brown et al., 1990) and schizophrenia (Mullen, Burges, Wallace, Palmer, & Ruschena, 2000) can precipitate relapse into substance use (Conrod & Stewart, 2005). A follow-up to the National Comorbidity Study also revealed that substance dependence was often preceded by at least one of the following: panic disorder, social phobia, specific phobia, posttraumatic stress disorder, separation anxiety, intermittent explosive disorder, oppositional defiant disorder, attention deficit disorder, bipolar disorder and dysthymia (Kessler et al., 1994; Swendsen et al., 2010). Additionally, treatment of depression has led to reductions in SUDs (Curry et al., 2012). Although symptoms of depression have been found to precipitate substance use, a direct causal relationship between substance use and depressive episodes has not been firmly established (Hodgins, el-Guebaly, Armstrong, & Dufour, 1999). Furthermore, evidence to date does not support the premise that

substance use attenuates specific mental health symptoms, which indicates that the self-medication hypothesis is flawed (Mueser et al., 1998). Therefore, the Secondary Substance Use Disorder model is also unable to fully account for the comorbidity patterns between SUDs and other mental health disorders.

2.3.1.3 The Bidirectional model. A third model exists to explore mental illness and SUDs comorbidity, which centers around the premise that each disorder is etiologically unique but the course of each illness mutually exacerbates the other (Conrod & Stewart, 2005; Langas et al., 2011; Mueser et al., 1998; Neale & Kendler, 1995). It follows from the Bidirectional model that intervention must focus on concurrent treatment of mental illness and SUDs (Hesse, 2009). Mental disorders and SUDs are frequently comorbid and this comorbidity is associated with worse treatment outcomes, decreased effectiveness of pharmacological interventions, and increased hospitalization and health care use (Conrod & Stewart, 2005; Siegfried, 1998; Thornton et al., 2011). Likewise, comorbid SUDs and depression have been linked to poorer prognosis for both mood disorders and SUD severity (Hodgins et al., 1999). A similar conclusion is reached in the case of anxiety disorders, especially with generalized anxiety disorder (Back & Brady, 2008; Reedy & Hall, 2008; Smith & Book, 2010). Prognosis also becomes increasingly guarded when SUDs are comorbid with personality disorders, especially antisocial and borderline personality disorders (Reedy & Hall, 2008). Finally, in support of this model, integrated treatments addressing both mental health diagnoses and SUDs result in improved outcomes for all conditions (Hilarski & Wodarski, 2001; Watkins et al., 2011). However, there is relatively limited research testing the validity of Bidirectional models (Mueser et al., 1998).

2.3.1.4 The Common Factor model. Finally, the fourth model predicts that SUDs and mental health disorders share a common underlying third variable (Conrod & Stewart, 2005; Mueser et al., 1998; Neale & Kendler, 1995). Therefore, treatment from the Common Factor model perspective would increase in efficacy if the common etiological mechanism was targeted (Conrod & Stewart, 2005; Neale & Kendler, 1995). Models which posit the causal influence of a third variable have centered on neurobiological vulnerabilities (Chambers, Krystal, & Self, 2001; Kendler, Aggen, Knudsen, Roysamb, Neale, & Reichborn-Kjennerud, 2011), environmental factors (Gonzalex-Guarda, Florom-Smith, & Thomas, 2011), and personality risk factors (Conrod, Pihl, Stewart, Dongier, 2000a) as shared vulnerabilities to account for predispositions to both SUDs and psychiatric conditions. Several factors, such as frontal lobe development, have been found to contribute to both SUDs and mental health conditions. Specifically, prefrontal gray matter volume has been associated with a diagnosis of antisocial personality disorder, and compared to healthy controls, individuals with a SUD also display reductions in prefrontal lobe gray matter volume (Muller et al., 2008; Raine, Lencz, Bihrle, LaCasse, & Colletti, 2000; Yang & Raine, 2009). Raine and colleagues (2000) posited that the reduced gray matter may be associated with a reduced sensitivity to punishment, and heightened impulsivity and sensation seeking, as these traits have been linked to the prefrontal cortex. Moreover, evidence implicates low levels of dopamine in emotional dysregulation and impulsivity, which are cornerstone features of both antisocial and borderline personality disorders and SUDs (Friedel, 2004; Gerra & Zaimovic, 2002). In addition, genetic vulnerabilities

may account for the increased frequency of expression of both SUDs and conduct disorder/antisociality in adolescence (Gerra & Zaimovic, 2002).

Furthermore, one environmental factor which has received support as underlying the relationship between SUDs and mental health diagnoses is that of a syndemic culture (Gonzalez et al., 2011). This term refers to the combination of poor physical and social conditions leading to intertwined health issues (Singer, 2009). Many syndemic populations, such as inner-city residents, experience increased rates of mental health and substance misuse issues (Gonzalez et al., 2011).

Finally, personality traits have received support as integral facets of both SUDs and psychiatric diagnoses. Specifically, personality traits such as neuroticism and openness (Ball, 2001); temperament traits such as reactive control, lower resiliency and negative emotionality (Caspi, Moffitt, Newman, & Silva, 1996; Martel et al., 2009); and impulsivity and anxiety sensitivity (Conrod et al., 2000a; Hopley & Brunelle, 2012) each have been associated with SUDs and psychiatric symptomatology. Such Common Factor models of comorbidity have gained popularity and considerable research support in recent years (Castellanos-Ryan & Conrod, 2011).

It is unlikely that one single theory accounts for the large overlap between SUDs and all other psychiatric conditions. However, a large body of evidence (see Kessler, Petukhova, & Zaslavsky, 2011; Krueger & Markon, 2006a) suggests that specific risk factors may predispose individuals to different groups of disorders. Therefore, a small number of common variables may underlie a variety of disorders (Krueger & Markon, 2006a). For example, invariant of gender, neuroticism was shown to account for 20-45% of the comorbidity between internalizing disorders (i.e., major depression, generalized

anxiety disorder, panic disorder, social phobia, and specific phobia), 19-88% of the comorbidity between internalizing and externalizing disorders (i.e., substance dependence, antisocial personality disorder, and conduct disorder) and 10-12% of the comorbidity between externalizing disorders (Khan, Jacobson, Gardner, Prescott, & Kendler, 2005). Moreover, an analysis of 14 epidemiological surveys conducted by the World Health Organization revealed that latent internalizing or externalizing variables accounted for a significant portion of comorbidity between disorders (Kessler et al., 2011). Kessler and colleagues (2011) concluded that the Common Factor model best explains the comorbidity between disorders. This has even prompted scientists to call for a reorganization of mental disorders in the DSM based on broad categories of risk factors, within which there is a focus on the hierarchical nature of psychopathology, rather than symptom profiles (Khan et al., 2005; Krueger & Markon, 2006a; Krueger & Markon, 2006b). Specifically, quantitative models (e.g., structural equation models) have been recommended that allow for direct comparisons of hierarchical classification theories to ensure underlying variables provide the best fit to the data (Krueger & Markon, 2006a; Krueger & Markon, 2006b). This idea, which supports the common factor model, suggests that future studies should attempt to delineate the pathways that may lead to SUDs and other comorbid diagnoses. These models may then be expanded to incorporate relevant nosological and etiological variables that can then be used to increase understanding of the mechanisms which drive treatment effects (Krueger & Markon, 2006b).

2.4 Treatment Efficacy in Substance Misusing Populations

Although the need for alcohol and drug use interventions is high, the evidence examining their efficacy is mixed. First, regardless of treatment modality, patterns of relapse are similar for dependence on any class of substance, with maximum risk for a return to use occurring within the first 70 to 100 days of continuous abstinence (Kirshenbaum, Olsen, & Bickel, 2009). Therefore, prevention of relapse and maintenance of abstinence in the first three to four months following treatment is key to maintaining treatment gains. However, the majority of patients engaged in substance treatment will relapse shortly after termination (Kirshenbaum et al., 2009). Despite passing this critical period, maintenance of gains is difficult. Examination of outcomes for a drug counseling group program revealed that not only can gains be lost, but post-treatment outcomes can deteriorate past baseline rates (Greenfield, Trucco, McHugh, Lincoln, & Gallop, 2007).

Imel, Wampold, Miller, and Fleming (2008) conducted a meta-analysis that compared various psychosocial treatments for alcohol use disorders. There were no differences in outcomes between a 12-step model (i.e., Alcoholics Anonymous), motivational enhancement therapy, aversion therapy, relapse prevention, and psychodynamic treatment. In addition, Imel and colleagues (2008) noted that allegiance to a particular form of treatment was a significant determining factor of improved treatment outcomes. Regarding specific forms of treatment, Alcoholics Anonymous has, in some cases, been found to be less effective than no treatment (Kownacki & Sadish, 1999). Another examination of AA revealed that participation in the 12 steps did not influence physical or mental health, nor alcohol or other drug severity outcomes

(Stewart, 2009). A similar pattern emerged for group cognitive behavioural therapy programs for those with alcohol dependence. Participation in such treatment was not associated with improvements in mental health symptomatology or drinking behaviours at three month follow-up, despite positive outcomes after one month (Ness & Oei, 2005). However, other meta-analyses have reported positive and robust effect for contingency management and cognitive behavioural protocols in the treatment of alcoholism, opioid dependence, and cocaine dependence (Carroll & Onken, 2005; Prendergast, Podus, Finney, Greenwell, & Roll, 2006). Unfortunately, long-term efficacy of contingency management dwindles after the contingencies (i.e., reinforcements) are removed (Carroll & Onken, 2005). Motivational interviewing for drug misuse is typically only effective when combined with another approach, such as contingency management, cognitive behavioural therapy, or couples and family therapy (Carroll & Onken, 2005). Psychosocial interventions are also more effective for clients who are socially stable, have less cravings, and less depressive or anxious symptoms (Bottlender & Soyka, 2005). In addition, although treatment effects may reach statistical significance, whether findings are clinically significant is an issue that is central to treatment programs (Cisler, Kowalchuk, Saunders, Zweben, & Trinh, 2005). For example, Greenfield and colleagues (2007) reported reductions in the number of drinks per drinking day of 1.19 drinks in the six month post-treatment phase, from approximately seven to six drinks. Importantly, this post-intervention outcome would still be considered binge drinking (i.e., more than five drinks per occasion), a pattern of consumption associated with significant health risks (Fillmore & Jude, 2011; Skov-

Ettrup, Eliasen, Ekholm, Gronbaek, & Tolstrup, 2011). On the other hand, this finding is worthy of note from a harm-reduction perspective.

Treatment prognosis becomes even more guarded when the individual has comorbid mental health conditions (Hesse, 2009). Therefore, integrated psychosocial treatments have been proposed to better address the needs of those with dual diagnoses (i.e., addiction and other mental health diagnosis). Integrated treatments attempt to address both disorders in parallel, rather than using the traditional sequential approach (Clearly, Hunt, Matheson, & Walter, 2008). In a systematic review of SUDs with comorbid depression and anxiety, Hesse (2009) noted that integrated treatment for SUDs and depression resulted in reductions of both depressive symptoms and substance use. In general, integrated treatments appear to yield more positive outcomes on both SUDs and mental health symptoms than when addressing each condition alone (Cleary et al., 2008; Hesse, 2009).

One potential reason for the modest treatment outcomes reported in the literature may be that these addiction treatments do not generally acknowledge or target the heterogeneity among substance misusers. Numerous researchers have highlighted how individuals affected by SUDs display different biopsychosocial risk factors for addiction (Amodia, Cano, & Eliason, 2005; Conrod et al., 2000a; Dutra et al., 2008). Based on the premise that treatment outcome would be superior if it was adapted to individual characteristics, Project MATCH, the largest and most expensive randomized controlled trial of alcoholism treatment at the time, was conducted in the United States. MATCH examined whether a differential response to treatment alternatives would be found if individuals were matched to treatment based on specific variables (Allen et al., 1993).

Treatment protocols included twelve-step facilitation of Alcoholics Anonymous, motivational enhancement therapy, and cognitive-behavioural coping skills therapy. Matching variables included, among others: gender, ethnicity, psychiatric severity, severity of alcohol dependence, anger, assertion of autonomy, religiosity, self-efficacy, readiness to change, and social functioning. Overall, matching effects were quite limited. Indeed, of the 64 hypotheses, only one primary and two secondary hypotheses were supported. Moreover, the differences between treatment types were modest, with slightly superior outcomes reported in the twelve-step facilitation group above and beyond the other therapies. Outcomes were fair overall, as 30% of the sample was abstinent between 37-39 months post-treatment. Drinking was reduced from 11 drinks at baseline to between 6 and 7 per drinking occasion post-intervention (Allen et al.,1998a). In addition, Allen and colleagues (1998b) noted that twelve-step facilitation was developed to improve participation in Alcoholics Anonymous and is not synonymous with Alcoholics Anonymous. This is because twelve-step facilitation was delivered on an individual basis, by a professional therapist. Therefore, Alcoholics Anonymous is not a substitute for twelve-step facilitation (Allen et al., 1998b). Due to the lack of findings supporting matching hypotheses, preliminary conclusions drawn from this study revolved around the idea that matching client traits to treatment strategies was ineffective (Copello et al., 2007; Walters, 2002). However, it has been suggested that the lack of evidence in favour of treatment matching in this large scale outcome study may have been due to the improper selection of matching variables (Babor & Del Boca, 2003).

In Project MATCH, treatment assignment relied especially on demographic variables and psychological characteristics (e.g., self-efficacy), variables which do not appear to play a central role in eliciting differential treatment response. Greater efficacy may have been obtained if this study had focused on targeting the individual's biopsychosocial risk factors (Berglund et al., 2003; Conrod et al., 2000a). For example, matching pharmacological interventions to neurobiological vulnerability has shown promise (Rist, Randall, Healther, & Mann, 2005). As such, naltrexone, which blocks alcohol-induced opioid release, has been found to more effectively reduce subjective euphoria following alcohol consumption in individuals with a genetic vulnerability (i.e., mutation of the μ-opioid receptor; Setiawan et al., 2011). In summary, Project MATCH may have failed in its attempt to highlight the importance of treatment matching by unintentionally selecting unsuitable matching variables.

2.5 Making Sense of Heterogeneity: The Development of Typologies

In order to understand the heterogeneity among those with SUDs to better inform the selection of matching variables, several researchers have attempted to classify misusers into typologies. A typology can be univariate, when discrete categories are formed on the basis of a single variable, or multivariate when a combination of variables are used to distinguish between the groups (Basu et al., 2004; Goodwill, Alison, & Beech, 2009). Due to the diversity of potential categorizations, the purpose of the typology (i.e., assignment to treatment, determining treatment prognosis, etc.) is essential in guiding the development of the classification (Basu et al., 2004; Byrne & Roberts, 2007).

In order to be successful, typologies should meet a number of criteria that have been defined in a seminal paper presented by Gibbons (1975). First, typologies must be both clear and objective. Therefore, independent assignment to discrete categories should be made reliably (Gibbons, 1975). Second, the categories within a typology should be mutually exclusive, in that there should not be overlap between groups and each group should have a unique theoretical underpinning (Byrne & Roberts, 2007; Gibbons, 1975). Third, a typology should be comprehensive, that is, the majority of individuals should be classifiable into a subtype (Gibbons, 1975). Finally, a typology should be parsimonious, with no more categories than required (Gibbons, 1975). However, many typologies fail to meet the majority of these criteria (Byrne & Roberts, 2007; Gibbons, 1975). In the following section, the main typologies that have been developed to address substance misuse will be presented.

2.5.1 Prominent typologies of substance misuse. The first ever typology of alcohol use was proposed by Jellinek (1960), who subdivided alcoholics into five subtypes (alpha, beta, gamma, delta, epsilon) based on the clinical course of the disease. However, this typology stimulated little interest from researchers. Subsequently, Cloninger (1987a) developed a multivariate typology of alcohol misuse which, contrary to Jellinek's (1960), stimulated a large amount of empirical research (Leggio, Kenna, Fenton, Bonenfant, & Swift, 2009). His work was based on participants from the Swedish adoption studies (Cloninger, 1987a). Individuals were classified into two groups based on their specific characteristics (Cloninger, 1987a). Type I alcohol dependence, which affected men and women equally, presented primarily with a late-onset (i.e., after age 25) of misuse. These individuals tended to self-medicate with

alcohol, experience feelings of guilt and fear, and respond well to treatment (Leggio et al., 2009). Further, there was a lack of family history of alcohol misuse among Type I cases (Cloninger, 1987a). Conversely, Type II alcoholics developed dependence prior to the age of 25, displayed a family history of alcoholism that suggested a genetic component, and were mostly male (Cloninger, 1987a). Furthermore, Type II alcoholics tended to drink to induce pleasure, engaged in antisocial behaviour and had a poor response to treatment (Cloninger, 1987a; Leggio et al., 2009). Recent neurobiological evidence has linked Type I alcohol dependence with low levels of dopaminergic transmission at basal ganglia dopamine transporter sites (Leggio et al., 2009). On the other hand, Type II alcoholics presented with deficits of serotonin transporter density in subsections of the limbic system, basal ganglia and the hypothalamus (Leggio et al., 2009; Storvik, Haukijarvi, Tupala, & Tiihonen, 2008). Of interest, the personality characteristics typically present in Type I alcoholics corresponded with traits observed in patients with Parkinson's disease, such as low novelty seeking, which has been tied to dopamine deficiencies (Leggio et al., 2009). Furthermore, the impulsive and aggressive traits observed in individuals with Type II alcohol dependence were similar to those seen in those with serotonin neuroregulation deficits (Cloninger, 1995). However, the genetic contribution of serotonin to Type II alcoholism appears minimal (Parsian & Cloninger, 2001). In addition, full replication of the typology is inconsistent and fails the mutual exclusion criteria set by Gibbons (1975), given that many individuals meet criteria for both categories (Penick et al., 1990). For example, Penick and colleagues (1990) were only able to categorize 6% of a sample of alcoholics into Type I or Type II, primarily using age of onset because no other variables were able to distinguish between

groups. Nevertheless, a major strength of the Cloninger (1987a) typology is that it posits links between biological underpinnings and observable characteristics, such as personality traits, in alcoholism.

Given that the Type I and II typology of alcoholism was derived from personality theory, Cloninger (1987a) postulated several personality-related hypotheses. First, Type I alcoholics were expected to present with low levels of novelty seeking, as well as high levels of both harm avoidance and reward dependence (Cloninger, 1987a). Alternatively, Type II alcoholics were hypothesized to possess high levels of novelty seeking, and low levels of harm avoidance and reward dependence (Cloninger, 1987a). Novelty seeking is conceptualized as a pattern of responding to novelty and appetitive stimuli which leads to exploratory behaviours in an attempt to reduce boredom and discover reward (Cloninger, 1987b). Harm avoidance is described as a tendency to react to aversive stimuli with intensity, which after repeated pairings leads to an inhibited pattern of behaviour in order to avoid punishment and novelty (Cloninger, 1987b). Finally, reward dependence is characterized as intense responding to reward stimuli that prevent extinction of behaviours previously associated with reward (Cloninger, 1987b). The Tridimensional Personality Questionnaire was developed to assess these three personality dimensions (Cloninger, 1987b). This model has been investigated in samples of community adults, undergraduates and college students (Parker, Bagby, & Joffe, 1996; Sher, Wood, Crews, & Vandiver, 1995). Although novelty seeking has been associated with SUDs and criminality, harm avoidance and reward dependence have had less predictive value (Howard, Kivlahn, & Walker, 1997; Meszaros et al., 1999; Sher et al., 1995). In addition, the Tridimensional Personality Questionnaire does not always

replicate its factor structure or classify individuals correctly, with difficulties persisting even after major revisions (Ball, 2001; Earleywine, Finn, Peterson, & Pihl, 1992; Nixon & Parsons, 1990).

In response to these criticisms leveled against the Cloninger (1987a) typology, Babor, Dolinsky, Meyer, Hesselbrock, Hofmann and Tennen (1992a) proposed a more detailed multivariate typology after performing a cluster analysis on measures collected from alcoholics in treatment. This model was more intricate than Cloninger's (1987a) work, as it consisted of 17 domains that included personality traits, comorbid mental health disorders, patterns and severity of substance misuse, and family history (Babor et al., 1992a). Following cluster analysis, Babor and colleagues (1992a) proposed a two-cluster solution, Types A and B, which closely mirrored Cloninger's Type I and II typology (Babor et al., 1992a; Cloninger, 1987a). Type A alcoholics presented with a late-onset of alcoholism, few childhood risk factors, less severe SUD symptomatology, less overall psychopathology and levels of stress, fewer alcohol-related social and physical consequences, and less attempts at treatment (Babor et al., 1992a; Babor et al., 1992b). Conversely, Type B alcoholics presented with earlier disease onset, more childhood risk factors, a familial pattern of alcoholism, more psychopathology and stress, and a chronic treatment history (Babor et al., 1992a; 1992b). Unlike the Type II classification model, both sexes were equally represented in Type B alcoholism (Babor et al., 1992a; Cloninger, 1987a).

Despite its strengths, the model proposed by Babor and colleagues (1992a; 1992b) is not parsimonious. Schuckit and colleagues (1995) discovered that clustering with five domains produced equal levels of classification to clustering based on the

original 17 variables. The predictive dimensions consisted of ounces of alcohol consumed per day, relief drinking, medical conditions and physical and social consequences of drinking (Schuckit et al., 1995). It is important to note that age of onset was not one of the predictive variables for classification into Type A or B alcoholics. Furthermore, both Cloninger's (1987a) Type II and Babor and colleagues (1992a) Type B alcoholism have been criticized as simple representations of either addiction severity or antisocial personality disorder (Schuckit et al., 1995). Although this issue remains a concern, Schuckit and colleagues (1995) were able to maintain the two-cluster solution even after controlling for antisocial personality disorder. Nevertheless, previous two-factor typologies of alcoholism (Type I/II and A/B) do not appear to capture a number of variables that are etiologically related to alcohol or substance misuse, such as motives for using. Indeed, although these typologies provide a descriptive profile of drinking habits, they do not capture the factors which are relevant to the onset and maintenance of maladaptive alcohol consumption. Thus, additional typology studies have been conducted.

One recent typology attempted to include a broad number of variables associated with alcohol misuse, including age of onset, severity, family history, and comorbid mental health disorders (Moss, Chen, & Yi, 2007). Moss and colleagues (2007) utilized the United States National Epidemiological Survey on Alcohol and Related Conditions, which included 43,093 participants. The best fit to a 29 dimension model was a five-cluster solution that was labeled: the Young Adult, the Functional, the Intermediate Familial, the Young Antisocial, and the Chronic and Severe Alcohol Dependent (Moss et al., 2007). The Young Adult cluster presented typically with an early age of onset and

a low prevalence of antisocial personality disorder and mental health comorbidities (i.e., anxiety, mood and SUDs). The Functional class possessed low rates of antisocial personality disorder, later onset, moderate rates of comorbidity, and a familial pattern of alcoholism. The Intermediate Familial subtype had an intermediate age of onset (i.e., aged between 25 and 40), severe family history and higher rates of comorbid mental illnesses and antisocial personality disorder. The Young Antisocial cluster possessed the earliest age of onset, the highest rates of antisocial personality disorder and a family history of substance misuse. Finally, the Chronic and Severe category showed an early onset of drinking with a late onset of dependence, high rates of antisocial personality disorder and comorbidity, many symptoms of withdrawal, and significant consequences of drinking (Moss et al., 2007). The 29-dimension model achieved optimal classification after taking age of onset, family history, antisocial personality, alcohol abuse symptoms, comorbid mood, anxiety, and SUDs into consideration (Moss et al., 2007). Although this model does not offer explanations as to why these variables were associated with the severity of alcohol use disorders, it has the advantage of accounting for the high comorbidity between SUDs and other psychological disorders (Moss et al., 2007).

Although the previously reviewed typologies have focused solely on alcohol misuse, a few have attempted to categorize drug misusers. However, comprehensive typologies of drugs outside of alcohol are rare, generally lack strength and have not generated much empirical interest (Basu et al., 2004). The majority of these models tend to be univariate in nature (Basu et al., 2004). For example, one single domain typology has focused on gender. Luthar, Cushing and Rounsaville (1996) discovered that female opioid abusers had higher psychiatric distress and internalizing problems in childhood

compared to males, who were more likely to present with conduct problems during youth and exhibit more social deviance. The authors argued that gender guides separate etiological or developmental pathways to opioid misuse and highlights the need to match treatment to gender.

Similar to the alcohol models presented by Cloninger (1987a) and Babor and colleagues (1992a), typologies of drug misuse have also focused on age of onset. Clark, Kirisci and Tarter (1998) discovered that, compared to adult-onset drug users, adults who initiated substance misuse in adolescence presented with higher lifetime rates of cannabis and hallucinogen misuse, achieved diagnoses of dependence sooner, and displayed increased prevalence of behavioural disorders and major depression (Clark et al., 1998). The authors concluded that individuals who began using in adolescence are a distinct group, characterised by rapid progression, polysubstance use and mental health problems. Similarly, De, Mattoo and Basu (2003) clustered opioid-dependent men into an early or late onset group. Early-onset opioid dependent males were more frequently unemployed, progressed more rapidly to dependence, were more likely to be polysubstance abusers, displayed increased levels of sensation seeking and higher global psychopathology levels (De et al., 2003). Therefore, these studies suggest that an earlier age of onset is associated with a more severe pattern of drug misuse.

Feingold, Ball, Kranzler, and Rounsaville (1996) sought to replicate the Type A and Type B typology of alcohol misuse with users of various psychoactive substances (Babor et al., 1992a). Similar to the original model, the authors included premorbid risk factors (i.e., family history of alcoholism, family history of drug abuse, age of onset, and childhood problems), drug use and abuse measures, and general psychiatric measures

(i.e., anxiety and depression). Four separate cluster analyses were conducted for alcohol, cocaine, opiates, and marijuana to determine whether a similar structure appeared for each substance type. Of note, the proportions of individuals classified into Type A and B categories were similar for each drug, as was the ability of the risk factors to predict cluster membership across categories of substances. Type B was associated with increased withdrawal avoidance, severity of psychiatric symptomatology, severity of drug use, polydrug use, and childhood conduct disorder symptoms. Contrary to the male gender limited Type II, Type B included individuals of both genders. Although the models were similar for each drug category, family history of drug and alcohol problems and age of onset were weak variables in their potential to cluster individuals into either subtype (Feingold et al., 1996).

Classifications of drug users have also focused on personality, such as the model proposed by Ball (2001), which is based on the Big Five personality model. Ball (2001) hypothesized that substance misuse would be linked to high Neuroticism and Openness paired with low Extraversion, Agreeableness and Conscientiousness. After cluster analysis, a two-factor solution was found and appeared to be core dimensions of the Type I and II alcoholism, with those in the second cluster obtaining lower scores on Agreeableness and Conscientiousness and higher scores on Neuroticism and vice versa for the first cluster (Ball, 2001). In addition, a greater proportion of individuals in the second cluster presented with personality disorders (Ball, 2001). Therefore, the Big Five model appears to possess predictive validity similar to that of the models presented by Cloninger (1987a) and Babor and colleagues (1992).

Further typological classifications of drug misuse have centered on the unique dimension of antisocial behaviour (Cecero, Ball, Tennen, Kranzler, & Rounsaville, 1999). In a study of 370 substance abusers, Cecero and colleagues (1999) investigated how different combinations of personality disorders, including antisociality, predicted substance misuse at baseline and at 12-month follow-up. Individuals were classified into eight categories and substance use comparisons were conducted between groups, including: (1) adult antisocial behaviour versus full antisocial personality disorder; (2) antisocial personality disorder with low versus high psychopathy; (3) antisocial personality disorder with and without lifetime depression; and (4) antisocial personality disorder with versus without another Axis II disorder (Cecero et al., 1999). Lifetime depression was only associated with more frequent experiences of detoxifications at follow-up. However, antisocial personality disorder and comorbid Axis II psychopathology were the strongest predictors of substance use severity and polysubstance use. At follow-up, comorbid Axis II disorders were not associated with substance use or severity, but were associated with frequency of detoxifications (Cecero et al., 1999). This study suggested that the comorbidity between substance dependence and personality disorders, including antisocial personality disorder, may provide information regarding substance use severity and prognosis.

In the first study of its kind, Basu and associates (2004) directly compared four univariate models and one multivariate model of drug dependence. The univariate models consisted of age of onset, familial history of addiction, presence of antisocial personality disorder, and gender. The multivariate model was comprised of vulnerability (e.g., familial history and age of onset), chronicity (i.e., years of use), consequences (i.e.,

medical, physical and social ramifications, and severity), and psychopathology (i.e., antisocial personality, anxiety, and depression). Of note, the multivariate model closely resembled the Type A and B dichotomy. The multivariate typology possessed greater validity for predicting substance use, psychopathology, overall functioning, and outcome in comparison to the univariate models. However, it is worth repeating that the Type A and B typology has been criticized as being an exceedingly complex conceptualization of dependence severity that does not shed light onto the etiological factors underlying substance misuse. Therefore, better explanatory models are still required.

2.5.2 Motivational theory as a typology of substance misuse. The motivational theory of addiction is based on two fundamental principles: 1) individuals use substances to achieve a valued outcome, 2) substance misuse is characterized by antecedents and consequences unique to each individual (Cooper, 1994). These principles are founded on operant conditioning and the importance of reinforcement. That is, the frequency of behaviour is influenced by the consequences of that behaviour in the environment (Skinner, 1963). Positive reinforcement occurs when behaviour is followed by a positive or appetitive stimulus, whereas negative reinforcement involves the removal of an aversive stimulus that also results in an increase in behaviour (Skinner, 1963). For example, individuals who use substances to reduce negative emotions may have learned to do so, potentially through modeling, and this relief reinforces the substance using behaviour. Therefore, understanding the underlying motives or needs that drive individuals to substance misuse provides insight into the etiology and treatment of SUDs. Based on motivational theory, Cooper (1994)

developed a four-factor model of adolescent drinking motives. The first motive was enhancement, or drinking to increase positive mood. Drinking for enhancement has been linked to heavy alcohol use but is only indirectly related to problem drinking. The second motivational factor was drinking to obtain positive social rewards. Social motives are frequently endorsed, and are usually linked to lighter and less frequent alcohol use. Both social and enhancement motives function under the principles of positive reinforcement, given that appetitive alcohol-induced consequences lead to increased drinking behaviours. The third motive was drinking to reduce or regulate negative emotions, commonly known as self-medicating. Drinking to cope has been associated with heavier and more problematic drinking, in addition to increased incidences of drinking alone. Finally, the fourth motive was drinking to avoid rejection or social censure. Conformity motives were included due to the significant role peers play in influencing initial exposure to alcohol. Therefore, coping and conformity motives are driven by negative reinforcement as alcohol ingestion removes unpleasant emotions. However, few adolescents report drinking for conformity, except for those younger in age (Cooper, 1994). This has led to the exclusion of the conformity motive in adult models of substance use motives (Stewart, Zeitlin, & Samoluk, 1997).

This four-factor model of drinking motives was validated in the initial sample collected by Cooper (1994), for which the pattern of motives was consistent across gender, race and age. Among college students, social and enhancement motives are most central in the prediction of drinking problems (O'Connor & Colder, 2005; Read, Wood, Kahler, Maddock, & Palfai, 2003). Spencer, Castle, and Michie (2002) examined motives behind alcohol and cannabis use in individuals with psychotic disorders and

discovered that coping and enhancement motives were linked with substance use problems. The model was also replicated among adolescents in Switzerland, with enhancement and coping motives related to heavy drinking, alcohol use, and alcohol-related problems (Kuntsche, Knibbe, Gmel, & Engels, 2006). Although these previous studies have focused primarily on alcohol, this model also appears to apply to drug users. For example, a cocaine SUD has been linked to social and enhancement motives in men (Ward, Kersh, & Shanks, 1997). Problems related to marijuana use also have been linked to enhancement, social and coping motives (Hawkins, 2007; Simons, Correia, Carey, & Borsari, 1998; Spencer et al., 2002). Prescription opioid misuse, not surprisingly, has been linked to coping motives (Zacny & Lichtor, 2008). Finally, among youth accessing mental health treatment, coping motives were predictive of a current SUD (Hides et al., 2008). Overall, this model has received support among a variety of populations and suggests that coping and enhancement motives are most likely to be associated with problematic drinking and substance use.

The previously reviewed evidence on typologies of SUDs has highlighted a number of variables that appear useful in classifying substance misusers into more homogenous groups. These variables include: age of onset, comorbid psychopathology, polysubstance use, as well as distinct motives for drug consumption that appear to distinguish between substance users. However, except for the motivational theory of SUDs, a theoretical underpinning for why these variables are associated with substance misuse and how they relate to the unique neurobiological effects of drugs is lacking.

2.5.3 Towards a unifying theory of addiction: The Substance Use Risk Profile (SURP) typology. Conrod and colleagues (2000a) proposed a typology of

substance misuse that broadens the scope of the aforementioned models by incorporating motivation for engaging in substance use based on differential sensitivity to the neuropharmacological effects of substances. As discussed in Section 1.2, substances have distinct neurophysiological effects to which individuals may vary in their susceptibility, depending on their personality characteristics (Conrod et al., 2000a). Using a sample of substance misusing females, Conrod and colleagues (2000a) investigated whether personality and motivational attributes could classify substance misusers into separate subtypes. In addition, the authors examined whether this personality-based typology would be associated with distinct drug preferences and the presence of comorbid psychiatric disorders. Analyses revealed four main subtypes of substance abusers, and the Substance Use Risk Profile Scale (SURPS) was subsequently designed to measure these four personality profiles (Woicik, Stewart, Pihl, & Conrod, 2009). Each of these subtypes is discussed in turn below.

The first SURP subtype, anxiety sensitivity (AS), is conceptualized as a personality style that centers around the belief that anxiety or physical arousal leads to physical discomfort, embarrassment, or loss of mental control (Conrod, 2006; Lefaivre, Watt, Stewart, & Wright, 2006). High AS has been associated with the development of panic disorder and catastrophization of physiological sensations (Conrod, 2006; Stewart, Peterson, & Pihl, 1995). Therefore, individuals with elevated AS are motivated to use alcohol or anxiolytics due to the anxiety dampening effects of these substances (Stewart et al., 1995). High AS has been linked to increased alcohol use and problem drinking, and a faster trajectory to alcohol use (Mackie, Castellanos-Ryan, & Conrod, 2011; Stewart et al,. 1995). Among undergraduates, AS was also linked to increased frequency

of sedative misuse (Woicik et al., 2009). Further, individuals with elevated levels of AS report self-medication, specifically coping with anxiety, as a primary motive for substance use (Conrod et al., 2000a; Stewart, Karp, Pihl, & Peterson, 1997; Stewart & Zeitlin, 1995; Woicik et al., 2009). Neurobiologically, this motive for use is likely due to the agonistic (i.e., activating) effects of alcohol and anxiolytics on the GABAergic system, which results in relaxation and sedation. In the validation study, women high in AS presented with an increased risk for anxiolytic misuse, somatization disorder, and simple phobia (Conrod et al., 2000a). This result indicates that AS may be an important link between clinical anxiety and substance use.

The second SURP profile is introversion-hopelessness (I/H), which is a personality characteristic that may explain why depressed individuals frequently present with comorbid substance misuse (Conrod et al., 2000a). I/H captures sensitivity to punishment, consequently resulting in decreased goal directed behaviour (Conrod et al., 2000a; Woicik et al., 2009). Therefore, individuals high in I/H are susceptible to the effects of analgesics, which suppresses the inhibitory effects of punishment and alleviate both physical and emotional pain (Pihl & Petersen, 1995). Those high in I/H report engaging in substance misuse to cope with depressive symptoms (Blackwell, Conrod, & Hansen, 2002; Woicik et al., 2009). Conrod and colleagues (2000a) discovered that in female substance users, I/H was associated with depression, social phobia, panic disorder and opioid dependence. The preference for opioids may be due to the effects of this class of drug on the endogenous opioid system, which can modify the perception of physical and emotional pain.

The third SURP profile is labeled sensation seeking (SS), which is associated with a tendency to seek out novel, stimulating and exciting experiences (Conrod et al., 2000a; Woicik et al., 2009). Specifically, individuals high in SS are sensitive to alcohol due to its psychostimulant properties (i.e., intoxication and euphoria; Conrod, Petersen, & Pihl, 1997). This effect appears to be dependent on the ability of alcohol to increase dopaminergic activity, thereby engendering an intrinsically rewarding state (Depue & Collins, 1999). In addition, SS has been tied to binge drinking and frequency of alcohol use in adolescents and undergraduates (Castellanos-Ryan & Conrod, 2011; Castellanos-Ryan, Rubia, & Conrod, 2011; Woicik et al., 2009). In the validation sample, SS was associated with alcohol dependence but not to other forms of comorbid psychopathology (Conrod et al., 2000a). Regarding motives, SS has been linked to drinking for enhancement purposes; that is, to experience the euphoric effects of alcohol (Stewart & Devine, 2000; Woicik et al., 2009).

The fourth and final SURP subtype, impulsivity (IMP), is conceptualized as a self-regulation deficit that leads to a lack of inhibition in the face of an immediately rewarding stimulus, despite possible negative consequences (Pihl & Petersen, 1995; Woicik et al., 2009). Therefore, individuals high in IMP are sensitive to substances that provide significant reinforcement (e.g., stimulant use) and to polysubstance misuse (Conrod et al., 2000a). Finally, an impulsive or disinhibited personality is related to early-onset SUDs (Conrod et al., 2000a). In the validation study, this personality trait was associated with antisocial personality disorder and polysubstance use; namely, alcohol and cocaine dependence (Conrod et al., 2000a). Woicik and colleagues (2009) found that IMP was uniquely related to stimulant use and was associated with social,

enhancement, coping and conformity motives. IMP also has been related to conduct disorder (the precursor to antisocial personality disorder) and substance misuse in high school students (Castellanos-Ryan & Conrod, 2011; Castellanos-Ryan et al., 2011). Physiologically, individuals high in impulsivity may be especially sensitive to the effects of stimulants and alcohol due to their effects on monoamines, such as 5-HT, epinephrine, and norepinephrine, as they result in dopamine increases in the nucleus accumbens. Subsequently, the motivational salience of these substances is enhanced.

Given its focus on the distinct etiological pathways that may lead to substance misuse, the SURP typology may be especially proficient at matching prevention and treatment interventions to the needs of individuals. Several studies have been completed to ascertain the effectiveness of this typology in guiding prevention and treatment efforts. First, Conrod, Stewart, Pihl, Coté, Fontaine, and Dongier (2000b) recruited adult female substance abusers and randomly assigned participants to one of three 90-minute interventions. Participants received either a motivation-matched intervention (e.g., an individual high in IMP receives coping skills which target IMP), a motivation-mismatched intervention (e.g., an individual high in IMP is presented with strategies which target AS) and a motivational-control intervention (i.e., a motivational film on the consequences associated with substance misuse is presented, followed by a discussion of the film with the therapist). A six-month follow-up revealed that the matched intervention group reduced the frequency and severity of their alcohol and drug use most, with abstinence rates of 23% in the matched group, 11% in the mismatched group, and 6% in the control group. Furthermore, the matched group dropped an average of three diagnostic criteria after treatment, whereas the mismatched group dropped an

average of only one and a half symptoms. Thus, interventions matched to the personality profiles delineated in the SURPS typology lead to increased treatment gains versus non-matched or control conditions. This supports the importance of selecting treatment based on the etiologically relevant variables of the individual.

A number of subsequent studies have supported the relevance of the SURPS model for prevention and treatment initiatives. Conrod, Stewart, Comeau, and Maclean (2006) developed treatment manuals for adolescents that integrated cognitive behavioural strategies for the different personality risk factors. A total of 297 Canadian high school students who reported drinking alcohol were randomly assigned to a personality targeted intervention (i.e., group delivery; 2 sessions) or to a no treatment control group based on the most elevated personality risk category. A significant personality-by-intervention interaction was found, with positive outcomes related to drinking quantity, frequency, binge drinking, and problem drinking at the four-month follow-up. Castellanos and Conrod (2006) also attempted to discover whether personality interventions resulted in any positive outcomes unrelated to substance use among 13 to 16 year olds. Participants were randomly assigned to the same conditions as the previous study. Overall, matched interventions revealed decreases in depression when I/H was targeted, reduced panic attacks and truancy when AS was the focus, and a reduction in shoplifting for IMP. The lack of secondary gains in the SS group may be due to the fact that SS is primarily associated with alcohol misuse and not to any other forms of psychopathology.

Furthermore, both Conrod, Castellanos, and Mackie (2008) and Conrod, Castellanos-Ryan, and Mackie (2011) targeted personality in early adolescence to

determine whether drinking onset and bingeing in high risk youth could be delayed. A matched prevention intervention study similar to those conducted by Conrod and colleagues (2008; 2011) was conducted, with outcomes assessed at 6, 12 and 24 months post intervention. Control participants (i.e., the intent to treat group) increased their drinking over time, whereas the intervention group drank less at the post-intervention stage than at baseline (Conrod, Castellanos-Ryan, & Strang, 2010). The intervention was particularly effective in preventing binge drinking among those high in SS. The authors surmised that increasing the delay to initial alcohol consumption may offset the onset of an alcohol use disorder. Furthermore, these studies provided longitudinal evidence that the onset and escalation of substance misuse can be curbed.

2.5.4 Predictive validity of the SURP typology. The predictive validity of a typology is an essential, but often overlooked, criterion of typologies (Byrne & Roberts, 2007; Gibbons, 1975). The ability of the SURP to predict substance use behaviour has been initially evaluated. Specifically, among 1139 eighth and ninth grade students followed longitudinally, high AS was related to avoidance of illicit substances 12 months later (Krank, Stewart, O'Connor, Woicik, Wall, & Conrod, 2011). Conversely, high I/H was associated with increased alcohol use and frequency of intoxication, and was predictive of marijuana and hallucinogen use. Similarly, high SS was linked to heavy drinking and alcohol problems one year later, in addition to marijuana and hallucinogen use. Finally, high IMP was predictive of polysubstance dependence and problematic substance use (Krank et al., 2011). Together, these findings indicated that the SURP personality traits are uniquely predictive of various patterns of substance misuse.

In a second study, Castellanos-Ryan and colleagues (2011) examined whether disinhibition could mediate the relationship between personality traits and substance misuse indicators over a two-year period. The authors discovered that IMP was predictive of externalizing problems and conduct disorder, whereas SS was predictive of binge drinking frequency. Deficits in response inhibition were also predictive of conduct disorder symptoms, whereas reward response bias was predictive of binge drinking. Therefore, the SURP typology also differentially predicts the presence of other mental health diagnoses.

Finally, Mackie and colleagues (2011) examined the role of the four SURP personality variables in the prediction of psychological symptoms and alcohol use 18 months later. AS was predictive of anxiety symptoms, but negatively related to alcohol use and alcohol related problems. SS was uniquely associated with a growth in alcohol use and increased risk for binge drinking. IMP was not associated with alcohol use, but was predictive of antisocial behaviours. I/H was linked to increased internalizing and externalizing symptoms, but was associated with reduced alcohol use. Further, when high I/H is paired with high IMP, there was a faster decline in antisocial behaviour, compared to individuals high in IMP alone. In sum, this study demonstrated the importance of personality traits when attempting to explain the relationship between alcohol use and mental health symptoms.

Overall, the strengths of the SURP typology are numerous. In addition to being parsimonious, it is one of the only typologies of substance misuse to be theoretically driven. Furthermore, this model unifies different conceptualizations of addiction (i.e., neurobiological, genetic, personality) and accounts for the comorbidity between

addictions and other mental health disorders via an underlying mechanism (i.e., personality variables, motives for use). The SURP typology has also received initial support regarding its predictive validity. Finally, this model is associated with positive prevention and treatment outcomes. However, a thorough examination of the SURP in populations that exhibit high rates of SUDs, such as adult correctional settings, is lacking.

2.6 Substance Use in Correctional Settings.

Despite the high prevalence of SUDs in the general population, their rates are even more concerning in those who come into conflict with the law. First, substance misuse is a significant issue prior to incarceration. During the year preceding their incarceration, more than 70% of North American federal inmates reported engaging in substance misuse (Peters, 1993; Weekes, 2002). In a large sample of offenders newly admitted to Canadian federal institutions, 44.4% of offenders reported drinking alcohol at least once a week, with a more concerning 13.3% drinking nearly every day prior to incarceration (Brochu et al., 2001). On the other hand, 33.7% reported drug use on a weekly basis, with 19.1% disclosing daily use (Brochu et al., 2001). Moreover, substances were consumed on the day of incarceration in 94% of driving under the influence cases, 69% of assaults, 66% of thefts, 58% of murders, 56% of both break and enters and robberies, 45% of sexual assaults, 28% of drug offences and 22% of frauds (Brochu et al., 2001; Grant, 2009).

Based on the prevalence of substance misuse prior to incarceration, it is not surprising that this behaviour is often directly tied to criminal behaviour. In fact, drug-related incarceration charges have risen by 1000% since 1980 in Canada (Grant, 2009).

Although Canada falls behind the United States in the number of arrests tied to illicit substances, there are approximately 25% of offenders on parole and supervision in Canada for substance-related offences, with nearly 23% of inmates currently incarcerated for substance-related charges (Correctional Service of Canada [CSC], 2006; Grant, 2009; Motiuk & Vuong, 2005). Furthermore, substance misuse is a direct contributor to the revolving door effect, in which offenders are readmitted into custody due to suspensions in approximately 70% of cases (Weekes, Millson, Porporino, & Robinson, 1994). In addition, approximately half of Canadian offenders report that substance misuse was directly related to their offending behaviours (Brochu et al., 2001).

Regarding the prevalence of substance misuse in offenders, approximately 50%-70% of federally incarcerated individuals (i.e., serving a custodial sentence of two years or more) in Canada experience substance-related problems (Weekes, Moser, & Langevin, 1999). A review of 13 studies across four countries revealed that the prevalence of DSM-IV alcohol abuse and dependence fluctuated between 18-30% in male offenders and 10-24% in female offenders, whereas drug abuse and dependence prevalence rates ranged from 10-48% in men and 30-60% in incarcerated women (Fazel et al., 2006). These data contrast with the prevalence rates of psychotic illness (3-7% prevalence) and major depression (10% prevalence), but are more comparable to the occurrence of antisocial personality disorder in offenders (47% prevalence; Brink, 2005; Fazel et al., 2006; Lafortune, 2010). In fact, SUDs are the most common category of mental health diagnosis in correctional settings, followed by personality disorders, mood

disorders, and psychosis (Brink, 2005; Fazel et al., 2006). Thus, substance misuse remains an issue of concern among currently incarcerated individuals.

Despite significant attempts to limit inmate exposure to drugs, between 11 and 12% of Canadian offenders have positive urine screens annually, most commonly for marijuana, benzodiazepines, opiates, and cocaine (CSC, 2004). Although federal offenders have access to substance abuse counseling, these numbers highlight the challenges in targeting addictive behaviours in this population even when in custody.

2.6.1 Antisocial behaviour and SUDs: A theoretical perspective. As demonstrated by the previously reviewed high comorbidity rates, substance misuse and antisocial behaviour are strongly related (Fridell, Hesse, Jaeger, & Kuhlhorn, 2008). This may be due to the need to engage in crime to support drug use, drug users committing offences while under the influence (e.g., driving under the influence) or are dually influenced by underlying characteristics, such as antisocial personality disorder or other personality traits (Fridell et al., 2008). In one longitudinal study conducted over a 20-year period, 90% of individuals diagnosed with either antisocial personality disorder or a SUD were charged with at least one crime (Fridell et al., 2008). Among SUDs, stimulant and opioid dependence possessed the highest associations with criminal behaviours (Fridell et al., 2008).

As previously mentioned, the comorbidity between SUDs and antisocial personality disorder is high, which has led to a search for underlying vulnerability factors (Conrod & Stewart, 2005). Disinhibitory personality traits, such as impulsivity, are argued to play a central role in the comorbidity between antisocial behaviour and substance misuse (Krueger, Markon, Patrick, Benning, & Kramer, 2007). In fact,

impulsivity and aggression appear to be a vulnerability factor for all disorders on the externalizing spectrum, including substance misuse and antisocial behaviour (Krueger et al., 2007). Specifically, these two traits are posited to be lower order dimensions of low agreeableness and conscientiousness, which themselves are lower order factors of the broad domain of disinhibition (Krueger et al., 2007). A quantitative iterative cluster analysis and exploratory factor analysis revealed that substance use, criminal behaviour and impulsivity formed one cluster of externalizing behaviour, whereas the other was comprised of aggression, impatience and alienation (Krueger et al., 2007). Therefore, disinhibitory personality traits appear to account for one of the super-ordinate factors of externalizing disorders and behaviours.

Both Finn, Sharkansky, Brandt and Turcotte (2000) and Finn and Hall (2004) noted that social deviance was associated with alcohol misuse due to disinhibition. Two distinct pathways to alcohol problems were identified (Finn & Hall, 2004; Finn et al., 2000). The first involved underlying impulse control deficits, which lead to social deviance, antisocial traits and alcohol problems. The second was a sensation seeking pathway; a vulnerability pattern characterized by boredom proneness and, consequently, engagement in positively reinforcing experiences. Moreover, working memory deficits have been linked to disinhibited behaviours (Finn & Hall, 2004). It is hypothesized that a more limited working memory capacity is associated with decreased ability to consider alternative courses of action in the presence of rewarding stimuli (Finn, Bobova, Wehner, Fargo, & Rickert, 2005; Finn & Hall, 2004; Finn, Mazas, Justus, & Steinmetz, 2002). Finn and Hall (2004) discovered that short-term memory moderated the association between social deviance and problematic alcohol use. Therefore, at least one

aspect of cognitive ability accounts, in part, for the relationship between antisocial behaviours and substance misuse. Specifically, limited working memory may restrict individuals high in social deviance in their consideration of consequences in the face of immediate gratification, such as prior to or during the commission of crime or use of alcohol and drugs (Finn et al., 2005; Finn & Hall, 2004; Finn et al., 2002).

Several studies have been conducted in order to parse out the comorbidity between externalizing disorders in youth as well. Youth high in conduct disorder symptoms were administered the SURPS in an attempt to determine whether underlying personality variables may explain the comorbidity between substance misuse and antisocial behaviour at this stage of development (Castallanos-Ryan & Conrod, 2011; Castellanos-Ryan et al., 2011). These authors noted that externalizing problem behaviours (e.g., truancy, shoplifting), binge drinking, and drug use were all associated with high IMP. Conversely, SS was correlated only with binge drinking. Additionally, poor response inhibition partially mediated the relationship between IMP and conduct disorder, whereas reward response bias partially mediated the relationship between SS and binge drinking. In other words, IMP was associated with both substance misuse and conduct disorder via poor response inhibition, whereas SS was only predictive of binge drinking via reward sensitivity. Therefore, both personality traits were mediated by unique pathways (disinhibition or reward sensitivity). In conclusion, these studies suggest that IMP may be associated with externalizing behaviours due to poor behavioural control, whereas SS is uniquely related to alcohol misuse due to sensitivity to the rewarding properties of alcohol. In a prospective study, IMP and I/H were positively associated with higher levels of antisocial behaviours and alcohol use

(Mackie et al., 2011). Notably, cognitive-behavioural interventions that target IMP can reduce both antisocial behaviours and stimulant use among youth (Castellanos & Conrod, 2006; Conrod et al., 2008). Gray and colleagues (2003) discovered that I/H was positively correlated with the antisocial deviance factor of psychopathy. This correlation is potentially due to the negative consequences that may arise after engaging in impulsive acts. In sum, underlying variables (especially impulsivity) seem to partially account for the comorbidity between antisocial behaviours and substance misuse in both adults and adolescents and may be important targets for intervention.

2.7 Treatment of SUDs in Correctional Environments

Similar to the situation found in the general population, the high prevalence and costs associated with substance use in correctional environments highlights the need for effective interventions for this subgroup. The majority of treatment efficacy studies are comprised of offenders on probation or parole (Pelissier et al., 2001). However, Pelissier and colleagues (2001) conducted a large-scale evaluation of a cognitive-behavioural treatment program within correctional institutions in the United States. The sample consisted of 1569 inmates from 20 prisons of various security levels. These authors discovered that those who completed the intensive residency programs were less likely to be re-arrested or to engage in substance use in the six months subsequent to release. Specifically, only 3.1% of those treated were re-arrested, whereas 15% of the non-treatment group recidivated. Inmates at high risk for recidivism also benefited to a greater extent than low-risk inmates, which supports the necessity to match interventions to participant characteristics (Wexler, Melnick, & Cao, 2009).

Pharmacotherapy, cognitive-behavioural and therapeutic-community approaches to substance misuse treatment in corrections have generally demonstrated modest, but worthwhile outcomes if intensity is matched to severity (McCarthy & Waters, 2003; McCollister, French, Inciardi, Butzin, Martin, & Hooper, 2003; McMurran, 2007). However, behavioural, boot camp and group counseling approaches lack support as effective treatments (McMurran, 2007). Instances of compulsory (e.g., legally mandated) SUD treatment reveal a pattern of mixed and inconsistent outcomes, with generally unfavorable outcomes being more common (Klag, O'Callaghan, & Creed, 2005). This pattern of minimal to moderate effectiveness is similar among juvenile offenders and adult female inmates (Adams, Leukefeld, & Peden, 2008; Tripodi & Bender, 2011). In Canada, although offenders under federal jurisdiction have access to substance misuse interventions, provincial inmates have limited to no access to such treatment, which may contribute to the high prevalence and severity of SUDs seen in federal settings (Kitchin, 2005). This is due to the potential for provincial offenders to persist or escalate in their offending behaviours as they remain untreated. Subsequently, these offenders may be sentenced at the federal level, where they have access to specialized treatment programs. Taken together, this information reveals that substance misuse remains a challenging problem in correctional populations. However, the use of a framework which highlights offender heterogeneity may improve treatment efficacy in this population by permitting better matching and design of SUDs intervention programs.

2.8 The Risk Needs Responsivity Model: A Framework for Understanding Offender Behaviour and Rehabilitation

The Risk Need Responsivity (RNR) model was developed when Andrews, Bonta, and Hoge (1990) observed that offender interventions were not highly successful in reducing recidivism. These authors believed that this limited effect might be due to a lack of consideration for offender heterogeneity. The RNR model, which is primarily used for case management and intervention planning purposes, is founded on three primary principles: (1) risk level; (2) criminogenic needs; and (3) treatment responsivity factors (Andrews & Bonta, 2010; Andrews et al., 1990).

The risk principle stipulates that the level of risk should be matched to the level of service intensity. That is, low-risk cases should benefit from lower intensity services, whereas higher-risk offenders require more intense services in order to reduce recidivism risk. Matching intensity of treatment to offender risk level is an essential first step to risk reduction. As Andrews and colleagues (1990) noted, a mismatched level of service can worsen outcomes. Specifically, high-risk offenders who are offered low-intensity treatment have significantly increased rates of recidivism than those receiving high-intensity treatments (Bonta & Cormier, 1999). The converse holds true as well, in that low risk inmates who participate in high intensity treatment programs have a threefold increase in rates of recidivism versus those receiving low intensity treatment (Andrews & Bonta, 2010; Andrews et al., 1990).

The need principle refers to the importance of targeting criminogenic risk factors for intervention to reduce the identified recidivism risk level. Criminogenic needs are dynamic (i.e., changeable) risk factors that directly contribute to the likelihood of

committing a crime (Andrews & Bonta, 2010; Andrews et al., 1990). Therefore, modification of these variables should result in a reduced likelihood of criminal reoffending. The *big four* criminogenic needs, those which are the most predictive of criminal behaviour, include attitudes supportive of antisocial behaviours, antisocial peers, antisocial personality, and a history of antisocial behaviour (i.e., a static, unchanging variable; Polaschek, 2012). An additional four criminogenic need areas are moderately associated with criminal behaviour. These factors include family or marital discord, lack of education or employment, lack of pro-social leisure activities, and substance abuse (Polaschek, 2012). These variables are equally predictive of violent and criminal recidivism among high-risk offenders with and without mental health diagnoses (Bonta, Law, & Hanson, 1998). Minor, or non-criminogenic needs include self-esteem, mental or physical health diagnoses and general distress (Andrews & Bonta, 2010; Andrews et al., 1990). These non-criminogenic factors have little to no direct influence on criminal behaviour (Andrews & Bonta, 2010).

Finally, the responsivity principle of the RNR model is based on the premise that treatment interventions should be matched to the individual's strengths, capacities, and limitations (e.g., intellectual ability, learning styles, etc) and should be evidence-based (Andrews & Bonta, 2010; Andrews et al., 1990). Responsivity is divided into two components: general and specific (Andrews et al., 1990). The general responsivity principle argues that a cognitive-behavioural and social learning approach has shown the greatest impact with regard to teaching and learning new skills among offenders (Dowden & Andrews, 2000). The specific responsivity principle speaks to the need to tailor treatment targeting criminogenic needs to specific client characteristics such as

motivation, empathy, maturity, self-control, cognitive ability, sensation seeking, and social support (Andrews & Bonta, 2010; Andrews et al., 1990).

In contrast to the *nothing works* perspective of offender rehabilitation that dominated the field in the 1970s (Martinson, 1974), the RNR model takes a rehabilitative stance towards offender behaviour. A large body of evidence has supported interventions that comply with the RNR principles (Bales & Piquero, 2012; Dowden & Andrews, 2000; Dowden, Antonowicz, & Andrews, 2003). Specifically, Andrews and Bonta (2006) reported that when none of the three principles are incorporated into treatment, recidivism rates rise by 1% in community samples and by nearly 10% in custodial settings. Adherence to one principle decreases recidivism by approximately 5% in both community and custodial settings. When two out of three principles are involved in guiding treatment, reductions in recidivism of 10% and nearly 25% in these respective settings occurs. Finally, complete application of the RNR principles results in 35% and 17% reductions in recidivism in community and custodial settings, respectively. In summary, targeting recidivism via application of the RNR model engenders a success rate of 29%, nearly double that of bypass surgery for cardiovascular illness (15%; Andrews & Bonta, 2006a; Andrews & Bonta, 2006b; 2010).

The RNR model, which provides clear evidence in support of treatment matching, is currently the gold standard of offender treatment (Polaschek, 2012; Ward, Mesler, & Yates, 2007). Although the RNR model focuses specifically on criminal offending, it may be useful to extend its conceptualization as a framework for how substance misuse in offenders should be addressed. Indeed, a central tenant of the RNR

model is that offenders may differ in their risk factors for criminal behaviour and that interventions must, therefore, target these risk factors in order to be successful. Similarly, although the prevalence of SUDs in offenders is high, offenders vary in their patterns of use (e.g., preferred substance, type of SUD), and more importantly, differ in the biopsychosocial risk factors that contribute to their problematic addictive behaviour (Hopley & Brunelle, 2012). Therefore, similar to the needs component of the RNR model for general offenders, it may be helpful to identify the different subtypes of substance misusing offenders based on the specific etiological factors that underlie the addictive behaviour. The use of the SURP typology may be one way to aid in the differentiation of offenders for the purpose of matching services.

2.8.1 The use of the SURP typology with offenders. The SURP typology, which stipulates that elevations in I/H, AS, IMP and SS increase risk for specific misuse of particular substances and for comorbid psychopathology, has been empirically validated in adult female substance abusers in the community, as well as in adolescent students. However, some studies suggest that it may be useful to apply this typology with substance misusing offenders.

To our knowledge, few studies have explored the use of the SURP typology in offenders. In what is believed to be the first study on this subject, female Québec provincial offenders completed the SURPS and were matched to females from the general community on sociodemographic variables. Higher levels of IMP and SS were found in offenders in comparison to matched controls (Brunelle, Douglas, Pihl, & Stewart, 2009). Offenders also presented with increased rates of SUDs (especially stimulant misuse) and polysubstance dependence. In descending order, a stimulant SUD

and high levels of IMP and SS best predicted to which group participants belonged (i.e., offenders or community matched controls). It was suggested that both a stimulant SUD and IMP may contribute to criminal behaviour via decreased inhibition, whereas SS may be linked to offending as a function of perceiving criminal behaviours as exciting (i.e., thrill-seeking). Therefore, the results of the Brunelle and colleagues (2009) study suggested that IMP and SS may be the personality subtypes most commonly found in substance abusing offenders and represent pathways influencing both behaviours.

Hopley and Brunelle (2012) examined the role of the SURP personality traits as potential mediators in the relationship between psychopathy traits and substance dependence in male New Brunswick provincial offenders. Psychopathy is typically conceived as being composed of four broad dimensions, the interpersonal and affective facets (e.g., egocentricity, emotional callousness, manipulation and a lack of empathy) and the antisocial and lifestyle deviance facets (e.g., impulsivity, parasitic lifestyle; Hare & Neumann, 2009). Hopley and Brunelle (2012) noted high levels of SS and IMP in offenders, similar to those reported by Brunelle and colleagues (2009). Although SUDs were highly prevalent in the sample, a distinct relationship was found between personality traits and SUDs. IMP was associated with probable stimulant, alcohol, cannabis, and hallucinogen dependence, suggesting a pattern of polysubstance dependence. AS was negatively associated with opioid dependence and SS was associated with hallucinogen dependence. IMP partially mediated the relationship between overall psychopathy levels and both stimulant and alcohol dependence, whereas low AS partially mediated the relationship between overall psychopathy levels and opioid dependence. In summary, high IMP and low AS accounted for the

association between psychopathy and SUDs in this sample, suggesting that these traits may be relevant to understanding the comorbidity between substance misuse and antisocial behaviour.

2.9 Proposed Study

Although the previously reviewed literature suggests that the SURP typology may be useful in a substance misusing offender population, a thorough investigation into its validity within this context is necessary. To the knowledge of this author, no study has attempted to assess the generalizability of the SURP typology in offenders, nor has prior research confirmed the factor structure of the SURP in this population. Furthermore, the ability of a typology to predict future behaviour should be examined, but this step is frequently overlooked (Byrne & Roberts, 2007; Gibbons, 1975). Therefore, the predictive validity of this typology will be assessed by examining the potential role of the SURP personality variables in occurrences of self-reported institutional substance use during a three-month period.

2.9.1 Purpose of the investigation. The current study will be conducted to address four primary goals. The first goal is to validate the SURP typology in a forensic sample. Specifically, its associations with different patterns of comorbid mental health symptoms and SUDs will be examined. Based on the reviewed literature, it is hypothesized that:

- High AS will cluster with anxiety disorder symptoms, alcohol and sedative dependence, and the use of these substances for coping with anxiety.
- High I/H will be associated with mood disorder symptoms, alcohol and opioid dependence, and coping with depression motives.

- High SS will be linked solely to alcohol dependence and enhancement motives for use.
- High IMP will be linked to antisocial personality symptoms, stimulant and polysubstance dependence, and all motives for substance use.

The second goal is to determine whether any adjustments to the SURP typology are required in order to capture the specific characteristics of the offender population. It is hypothesized that:

- The IMP subtype will be the most prevalent subtype. High IMP will be most strongly associated with externalizing symptoms (i.e., antisocial personality disorder symptoms, early onset of substance use, and illicit institutional substance use).
- A unique subtype, characterized by low AS, will emerge. Based on previous research (Hopley & Brunelle, 2012), this profile will be associated with high psychopathy levels, opioid dependence, and both enhancement and coping motives for substance use.
- Low AS also will be positively associated with internalizing symptoms and negatively with externalizing symptoms.

The third goal of this dissertation is to explore the ability of the SURP model to predict offender substance use while incarcerated. It is hypothesized that:

- Individuals high in IMP at the beginning of the study will have an increased probability of engaging in self-reported substance use within a three month period relative to other SURP identified groups.

- The high IMP group will engage in self-reported substance use within the institution much faster than other emergent SURP subtypes during the three months following testing at Time 1.

The fourth goal of this dissertation is to gain a better understanding of the relationship between SUDs and criminal behaviour by examining the relationships between the SURP personality variables and associated behavioural indicators of substance misuse and antisocial personality disorder symptoms. This hypothesized prediction, illustrated by a path specification diagram, is shown in Figure 1.

- Behavioural indicators of SUDs represented in the model include: age of substance use onset and self-reported symptom severity ratings.
- Manifest variables unique to antisocial personality disorder include: criminal versatility (i.e., total number of types of offenses; See Appendix B), antisocial personality symptoms, age at first conviction, and number of times incarcerated.
- Manifest variables shared between SUDs and antisocial personality disorder include: total number of substance-related convictions, drug dependence symptoms and alcohol dependence symptoms.
- Specific pathways hypothesized are IMP to both SUD and antisocial personality disorder, SS to SUD, I/H to both SUD and antisocial personality disorder, and AS to SUD. A relationship between SUD and antisocial personality disorder is also expected. Pathways are predicted from antisocial personality disorder to: criminal versatility, antisocial personality symptoms, age at first conviction, and number of times incarcerated. Pathways are predicted from SUD to substance use onset and self-reported substance severity. Finally, shared manifest variables

of both SUD and antisocial personality disorder are expected to include: total number of substance-related convictions, drug dependence symptoms, and alcohol dependence symptoms.

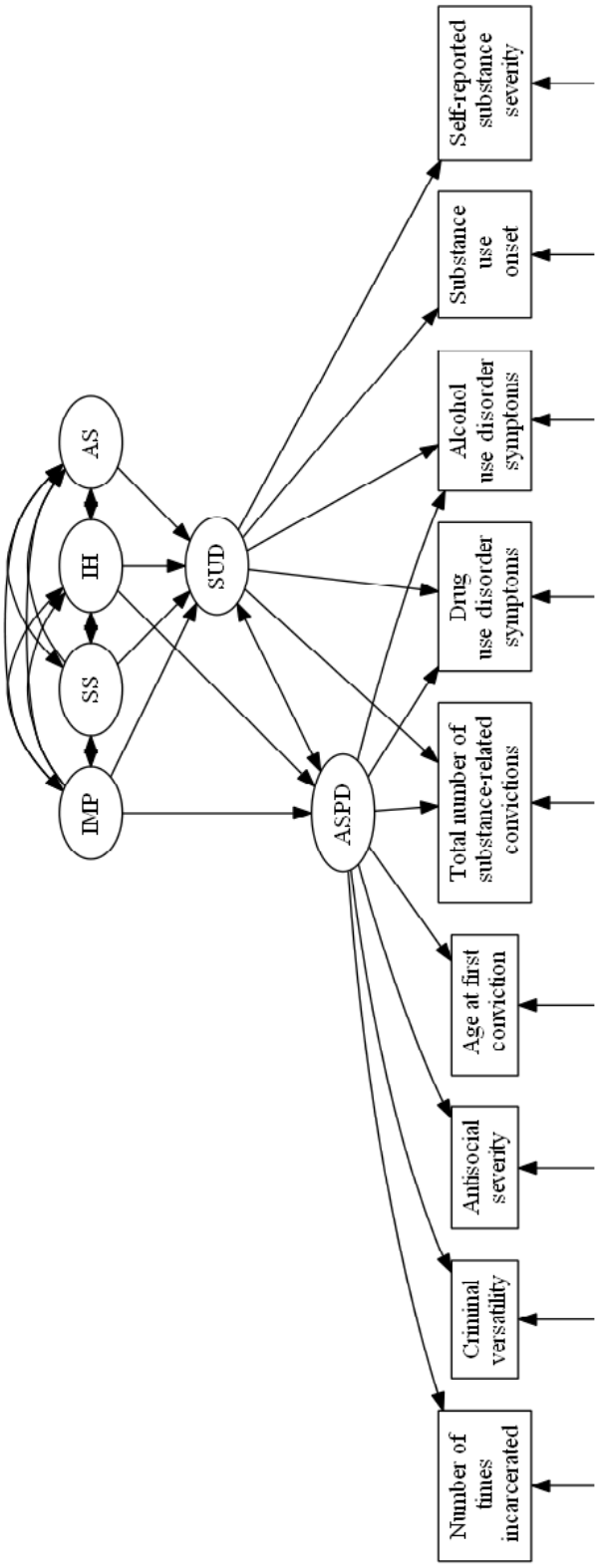


Figure 1. Hypothesized latent conceptual path analysis.

3. Methodology

3.1 Participants

A total of 132 English speaking, male, non-remand incarcerated offenders, serving either provincial (*n* = 69; serving up to two years less a day) or federal sentences (*n* = 49; serving two or more years) from correctional institutions in New Brunswick participated in the study. Some individuals (*n* = 14) were excluded from the sample due to incomplete data (i.e., incomplete questionnaires), and response distortions (i.e., exceeded cut-offs on questionnaire validity scales, etc.) resulting in a final sample of 118 participants. Provincial institutions consisted of: Madawaska Regional Correctional Centre, Saint John Regional Correctional Centre, Dalhousie Regional Correctional Centre and Shediac Regional Correctional Centre. Data collected from federal institutions took place at: Westmorland Institution (minimum security), Dorchester Penitentiary (medium security), and Atlantic Institution (maximum security). Participants were primarily Caucasian (68.6%). Additionally, nearly half of the sample reported earning a high school diploma (51.7%), whereas 19.8% had less and 23.4% had more than a high school education (see Table 2).

Participants also reported on all current convictions. On average, participants were serving sentences for five of thirteen crime categories (*SD* = 2.931; see Table 3). Participants were required to have served one month in their respective institutions in order to allow for adjustment to their correctional settings (range of months served = 1-218). Participants were initially excluded if they were expected to be released within three months following initial contact, in order to ensure their presence at follow-up. However, due to a restricted eligible participant pool, methodological changes

necessitated in the removal of this exclusion criterion. The follow-up period was removed and all questionnaires were administered at one time. Only males were selected due to the reduced accessibility to female offenders in the province of New Brunswick. Participation was limited to offenders between the ages of 19-49 years (M = 31.38 years; SD = 8.7 years), as criminal involvement and substance use have been noted to decline after middle age (Craig, 2009; Helmus, Thornton, Hanson, & Babchishin, 2012; Jolin & Gibbons, 1987; Sampson & Laub, 2003). This age effect has been noted regardless of gender, type of crime (e.g., violent, sexual) or race (Helmus et al., 2012; Jolin & Gibbons, 1987; Sampson & Laub, 2003). Only English speakers were chosen as some instruments have not been standardized in a French speaking sample.

3.2 Materials

Participants completed a package of questionnaires presented in a counterbalanced order. The general demographics questionnaire (Appendix A), developed by the author, was used to ascertain age, ethnicity, education level, and marital status. A second self-developed questionnaire (Appendix B) collected information regarding criminal history (i.e., age at first arrest, total number of incarcerations, nature of current convictions, etc.) and substance use (i.e., age at first use of alcohol and drugs, preferred substance, frequency of use, etc.).

In order to assess probable SUDs, the Substance Use Disorder Diagnostic Schedule Questionnaire (Hoffmann & Harrison, 1995; SUDDS-Q; Appendix C) was used. Participants were asked report on their use of a variety of substances in the year prior to incarceration. This yes/no measure is based on the DSM-IV diagnostic criteria for substance abuse and dependence (APA, 2000) and is a self-report version of a

diagnostic interview. The SUDDS-Q is considered a confirmatory measure of diagnosis (Davis, Hoffmann, Morse, & Luehr, 1992). As per DSM-IV diagnostic criteria, coding for a SUD is based on endorsement of one or more criteria for substance abuse and three or more for substance dependence (APA, 2000). A strong correlation between self-report and structured interviews of SUDs is typically obtained in forensic settings (Peters et al., 2000). Due to the recent release of DSM-5 (APA, 2013), which replaced abuse and dependence disorders with a single SUD, a single SUD variable (Alcohol Use Disorder $\alpha = .95$; Opiate Use Disorder $\alpha = .97$; Sedative Use Disorder $\alpha = .97$; Stimulant Use Disorder $\alpha = .97$) was created for each category of substances to better reflect the revised criteria.

The Substance Use Risk Profile Scale (SURPS; Woicik et al., 2009; Appendix D) is a 23-item questionnaire that was used to examine the personality dimensions of I/H, AS, IMP, and SS. These domains are conceptualized as being lower-order factors of the main personality dimensions measured by the Five Factor Model (i.e., openness, conscientiousness, extraversion, agreeableness, and neuroticism) and are more closely related to SUDs (Hopley & Brunelle, 2012; Krank et al., 2011; Mackie et al., 2011). These four personality dimensions were obtained by conducting a factor analysis following the administration of a battery of 16 personality questionnaires and symptom inventories to female substance abusers (Conrod et al., 2000a). The SURPS uses a four-point Likert scale, which ranges from *strongly disagree* (1) to *strongly agree* (4). The I/H subscale score can range from 7-28, the AS and IMP subscale scores can range between 5-20, and finally, the score on SS subscale can range from 6-24. Overall, the SURPS possesses good to excellent psychometric properties (see Woicik et al., 2009).

Numerous studies have reported adequate to excellent internal consistencies (α = .66 - .85; Castellanos & Conrod, 2006; Castellanos-Ryan & Conrod, 2011; Hopley & Brunelle, 2012), especially for subscales containing as few as five items. Within a male offender sample, the SURPS subscales have received good (AS, IMP, SS: α = .88) to excellent (I/H: α = .90) internal consistencies (Hopley & Brunelle, 2012). Two and twelve month test re-test reliability estimates fall in the acceptable to excellent range (intra-class correlation = .68-.88; Krank et al., 2011). In addition to reliability, both convergent and discriminant validity have been demonstrated (see Conrod, 2006; Conrod et al., 2008; Conrod & Woicik, 2002; Malmberg et al., 2010). The SURPS also possesses predictive validity, as scores on this instrument are associated with substance use 12 months later (Krank et al., 2011; Woicik et al., 2009). In the current study, the SURPS subscales possessed good internal consistency (I/H α = .78; AS α = .71; IMP α = .78; SS α = .72). Finally, the SURPS has been translated into many languages including French, Sinhalan, and Chinese, while maintaining its psychometric properties (Brunelle et al., 2009; Ismail, Seneviratne, Newcombe, & Wanigaratne, 2009; Siu, 2011).

A modified version of the Drinking Motives Questionnaire-Revised (MDMQ-R; Appendix E) was completed by participants to ascertain motives for participants' substance of choice (Cooper, 1994). This is the most frequently used measure in North America to assess drinking motives (Kuntsche et al., 2006). The DMQ-R is a 20-item scale that examines whether individuals engage in substance use to enhance positive emotions, to cope with negative emotions, for conformity reasons, or for social motives. In adult samples (as opposed to adolescents on which the tool was developed), the five questions associated with the conformity subscale are often removed from analysis

(Stewart et al., 1996). A three-factor model (i.e., social, enhancement, coping) has previously shown good fit to data for adults (Stewart et al., 1996). On the DMQ-R, participants rate the frequency of engaging in substance use for a particular reason on a Likert scale, which ranges from *never/almost never* (1) to *almost always/always* (5). Scores on each of the three subscales can range from 5-25. The DMQ-R has revealed adequate to excellent split-half reliability (r = .66-.85) and internal consistencies (α = .82-.91; Cooper, 1994; Kuntsche et al., 2006; O'Connor & Colder, 2005; Stewart et al., 1996). The DMQ-R accounts for a significant proportion of variance (14%-20%) in alcohol consumption and 26% of the variance in both heavy and problematic use, demonstrating construct validity (Cooper, 1994).

Despite the satisfactory psychometric properties of the DMQ-R, some concerns have been noted with this measure. First, enhancement and social motives are frequently correlated (Cooper, 1994; O'Connor & Colder, 2005; Simons et al., 1998). Second, it has been suggested that the coping subscale is too broad, as individuals may consume alcohol to alleviate depressive or anxiety symptoms, or both (Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). In addition, these motives may be differentially associated with patterns of substance use. In order to address these issues in the current dissertation, the coping subscale was divided into coping with anxiety and coping with depression subscales, as proposed by Grant and colleagues (2007). To achieve this division, the coping with anxiety item and the six coping with depression items developed by Grant and colleagues (2007) were added to the measure. Further, the existing coping item related to using substances when feeling depressed or nervous was divided into two separate items (Grant et al., 2007). Therefore, five items were used to

assess each of the social, enhancement, and coping with anxiety motives (range = 5-25) and eight assessed the coping with depression motives (range = 8-40), for a total of 23 items. This Modified DMQ-R (MDMQ-R) has shown acceptable to excellent internal consistencies (α = .73-.89). Test-retest reliability falls in the acceptable to good range (intra-class correlations = .65-.78). In addition, greater model fit is found when coping motives are divided into these two subscales (Grant et al., 2007). Concurrent validity is also maintained in the modified version, as motives continue to predict alcohol use patterns above and beyond demographic variables (Grant et al., 2007). In the current study, the MDMQ-R subscales achieved an excellent level of internal consistency (Enhancement α = .96; Social α = .93; Coping with Anxiety α = .94; Coping with Depression α = .95).

The Millon Clinical Multiaxial Inventory, third edition (MCMI-III; Appendix F), was administered to assess mental health symptomatology (Millon, 1994; Millon & Davis, 1997). This symptom inventory is theoretically based and has been continually revised over the last 30 years (Millon & Davis, 1997; Strack & Millon, 2007). The MCMI-III is a 175 true/false-item self report scale with an eighth grade reading level and norms for inpatients, outpatients, and inmate correctional samples (Millon, 1994; Millon & Davis, 1997; Strack & Millon, 2007). In the current dissertation, the correctional norms were used to score the MCMI-III. This measure consists of five validity scales (i.e., disclosure, desirability, debasement, invalidity, and inconsistency), 14 personality disorder scales (i.e., schizoid, avoidant, depressive, dependent, histrionic, narcissistic, antisocial, sadistic (aggressive), compulsive, negativistic (passive-aggressive), masochistic (self-defeating), schizotypal, borderline, and paranoid

personality), and 10 clinical syndrome scales (i.e., anxiety, somatoform, bipolar, manic, dysthymia, alcohol dependence, drug dependence, post-traumatic stress disorder, thought disorder, major depression, and delusional disorder; Millon, 1994; Millon & Davis, 1997; Strack & Millon, 2007). The MCMI-III is one of the most commonly used broad-based clinical assessment tools (Strack & Millon, 2007).

In a review of the psychometrics of the MCMI-III, both the personality disorder (α = .66-.89) and clinical scales (α = .71-.90) have all routinely exhibited good to excellent internal consistencies (Dyce, O'Connor, Parkins, & Janzen, 1997; Haddy, Strack, & Choca, 2005; Strack & Millon, 2007; Wise, Streiner, & Walfish, 2010). In the current study, the MCMI-III subscales possessed an excellent level of internal consistency (α = .95-.97). The test-retest reliability scores from five days to four months suggest the test is fairly consistent over time (r = .58-.93), with antisocial and borderline personality disorders possessing the highest test-retest correlations (Strack & Millon, 2007; Wise et al., 2010).

The MCMI-III has demonstrated good levels of concurrent (e.g., positive predictive validity with r values ranging between .84-.85 for the Major Depression scale), convergent (e.g., moderate correlations of .40-.41 between the Anxiety scale on the MCMI-III and panic and worry-related measures; a large correlation of .69 between the Major Depression scale of the MCMI-III and the BDI-II; moderate-high correlations between the Minnesota Multiphasic Personality Inventory Version 2 (MMPI-II) and the MCMI-III personality disorder scales), and discriminant validity demonstrated by high areas under the curve (i.e., ability to discriminate between patients with and without a disorder) for the Major Depression (AUC = .63-.71), Anxiety (AUC = .49-.51), and

Dysthymia scales (AUC = .58-.65; Hsu, 2002; Saulsman, 2011; Strack & Millon, 2007). In addition, both the personality dimensions and the validity scales of the MCMI-III do not correlate with theoretically inconsistent domains on the MMPI-II (Schoenberg, Dorr, Morgan, & Burke, 2004). Regarding the diagnostic threshold values, the MCMI-III has shown diagnostic accuracy above and beyond both unstructured clinical interviews and other self-report instruments (Strack & Millon, 2007). Sensitivity (i.e., percentage of clients identified by clinicians as having the same disorder as indicated on the MCMI) ranges from 54% to 92% (Strack & Millon, 2007). Finally, specificity (i.e., percentage of clients identified on the MCMI as not having a disorder, with clinicians also not identifying the presence of the disorder) has been shown to range from 94% to 100% (Strack & Millon, 2007). The MCMI-III has been used with both male and female offenders and substance dependent populations (Craig, Bivens, & Olson, 1997; Grabarek, Bourke, & van Hasselt, 2002; Retzlaff, Stoner, & Kleinsasser, 2002).

The Levenson Self-Report Psychopathy scale (LSRP; Appendix G) was used to assess the primary (i.e., selfish, uncaring, manipulative) and secondary (i.e., impulsivity, self-defeating lifestyle) factors of a psychopathic personality (Levenson, Kiehl, & Fitzpatrick, 1995). The LSRP scale is a 24-item questionnaire, with 16 items loading onto the Primary Psychopathy factor and 10 items loading onto the Secondary Psychopathy factor. The LSRP captures the psychopathy construct in a dimensional manner (Walters, Brinkley, Magaletta, & Diamond, 2008). Each item is scored on a four-point-Likert scale, on which responses range from *disagree strongly* (1) to *agree strongly* (4). Therefore, the Primary Psychopathy subscale score can range from 16-64, and the Secondary Psychopathy subscale score may range from 10-40. In offender

samples, the factor structure of the LSRP scale was replicated; however one item (i.e., love is overrated) was found to consistently load poorly on both factors (Brinkley, Schmitt, Smith, & Newman, 2001; Lynam, Whiteside, & Jones, 1999). Following Brinkley and colleagues' (2001) recommendations, this item was removed from the questionnaire in the current study, making the now modified Secondary scale range from 9-36. In addition, the measure displays good test-retest reliability across an eight week period (r = .83). Internal consistencies have been found to be high for the total score (α = .85), as well as the Primary Psychopathy subscale (α = .83), and acceptable to good for the Secondary Psychopathy subscale (α = .69; Brinkley et al., 2001). Internal consistencies fall in the good to excellent range (α = .82-.89) in non-forensic populations as well (Campbell, Doucette, & French, 2009). In the current correctional sample, the LSRP subscales possessed a good level of internal consistency (Primary α = .85; Secondary α = .85). In terms of convergent validity, LSRP scores are moderately correlated with other measures of psychopathy in both offender and non-forensic samples (r_s = .42-.72; Brinkley et al., 2001; Campbell et al., 2009).

The Timeline Follow Back Calendar (TLFB; Sobell & Sobell, 1996; Appendix H) method was used to record the potential use of illicit substances (type and quantity of substances used) during the three months prior to participation in the study. This tool required participants to retrospectively indicate, for each day on a three month calendar, the approximate amount and type of different substances used (e.g., two grams of cocaine; Sobell & Sobell, 1996). This method possesses several advantages compared to more commonly used quantity-frequency measures, because the TLFB provides a detailed overview of substance use patterns and variability in use (Gioia, Sobell, Sobell,

& Simco, 2012). Furthermore, a retrospective three-month window has been found to be representative of subsequent annual problematic substance use (Gioia et al., 2012). The TLFB method, when employed to assess alcohol use, has been found to possess high test re-test reliability (r = .85; Gioia et al., 2012). Strong correlations between self-report (TLFB) and collateral (i.e., hospital and jail records) reports also have been reported (r = .85; Fals-Stewart, O'Farrell, Freitas, McFarlin, & Rutigliano, 2000; Roy et al., 2008). Regarding illicit drugs, the retrospective three-month test-retest reliability ranges from acceptable to excellent (r = .69-.99; Fals-Stewart et al., 2000; Norberg, Mackenzie, & Copeland, 2012). Criterion validity has been assessed by correlating TLFB self-report and urinalysis results, and achieved acceptable to good validity for opiates (r = .58-.76), acceptable to good validity for stimulant use (r = .72-.81) and excellent for cannabis use (r = .90-.92; Fals-Stewart et al., 2000; Norberg et al., 2012). In terms of concurrent validity, TLFB results correlate moderately with other measures of alcohol and substance use severity (r = .30-.44; Fals-Stewart et al., 2000; Norberg et al., 2012). Finally, the TLFB possesses good reliability and validity in self-administered formats, as well as in group settings. In addition, no significant differences in reliability or validity are found when the TLFB method is used with individuals who possess a comorbid mental disorder (DeMarce, Burden, Lash, Stephens, & Grambow, 2007; Maisto, Conigliaro, Gordon, McGinnis, & Justice, 2008; Pedersen, Grow, Duncan, Neighbors, & Larimer, 2012; Pedersen & LaBrie, 2006).

Reliance on self-reported institutional substance use may seem suboptimal given the presence of file information in certain forensic settings. However, official records of substance misuse are likely to underestimate the actual amount of institutional drug or

alcohol use (Edens, Poythress, Lilienfeld, & Patrick, 2008). Edens and colleagues (2008) indicate that certain forms of institutional misconduct may be inadequately captured, potentially due to the fact that not all information is disclosed to prison staff. In this instance, urinalysis testing is only completed on a randomly selected 5% of the Canadian federal prison population per month. Consequently, file information is likely an underestimate of use in comparison to self-report (MacPherson, 2004). MacPherson (2001) also discovered that inmates were more likely to disclose institutional substance use compared to urinalysis detection.

3.3 Design and Procedure

The current dissertation was conducted following approval from the University of New Brunswick Research Ethics Board (Appendix I) and both provincial (New Brunswick Department of Public Safety; Appendix J) and federal (Correctional Services of Canada; Appendix K) correctional agencies. Offenders who self-identified as substance misusers of alcohol and/or drugs were recruited via written and verbal announcements circulated by staff (Appendix L). This announcement outlined the inclusion and exclusion criteria and the nature and purpose of the study. Offenders who expressed interest in learning more about the study were assembled into groups of 4-15 individuals to receive a description of the study from the principal investigator. Informed consent was sought after the details of participation were shared and potential participants had the opportunity to ask questions (see Appendix M). Potential participants were informed that any information provided would not be shared with staff and that their participation, or lack thereof, would not affect the course of their sentence or release. As per federal and provincial institutional policy, no monetary compensation

was offered. However, coffee and donuts were provided to participants at the provincial level, as used in a previous study (Hopley & Brunelle, 2012). No form of incentive was offered at the federal level, as per policy. Further, provincial participants had the opportunity to attend a sixty minute information session on practical coping strategies for the management of substance use. Federal institutions declined the offer to host these presentations. The environment in which data were collected consisted of either a classroom or program room with large tables, or less frequently, with individual desks. In order to preserve confidentiality, sufficient space was kept between participants. Furthermore, in provincial institutions, due to an institutional requirement of having a correctional officer in the testing room, officers were informed prior to collection that they would be seated at the opposite side of the room. Therefore, officers were unable to view participant's responses. Moreover, participants were instructed to complete the TLFB by entering zeros on the dates where they did not use substances, thereby eliminating the possibility that correctional staff could identify inmates who used in the past 90 days based on whether or not participants either wrote in that section or completed the battery of measures sooner. The total participation time ranged from 60-120 minutes, with an average completion time of 90 minutes.

Participants' substance use was assessed using the TLFB method following completion of the aforementioned measures. It was initially proposed that the TLFB would be completed three months following the initial data collection; however, due to recruitment difficulties and time constraints all measures were administered simultaneously.

Table 2

Demographics

Sample Characteristics	n (%)
Ethnicity	
Caucasian	81 (68.6%)
First Nations	11 (9.3%)
Bi-racial	10 (8.5%)
Undisclosed	6 (5.1%)
African-Canadian	4 (3.4%)
Asian-Canadian	3 (2.5%)
Latino	2 (1.7%)
Middle Eastern	1 (0.8%)
Marital Status	
Single	66 (56.9%)
Common-law	30 (25.9%)
Married	6 (5.2%)
Divorced/separated	13 (11.2%)
Widowed	1 (0.9%)
Education	
Elementary	2 (1.7%)
Middle School	21 (18.1%)
High School	60 (51.7%)
Some college	12 (9.5%)
College degree	11 (4.3%)
Some university	5 (3.4%)
Undergraduate Degree	4 (3.4%)
Undisclosed	2 (1.7%)
Postgraduate degree	1 (0.9%)

Table 3

Criminal Characteristics

Sample Characteristics	Mean (*SD*)	n (%)
Age at first arrest	18.36 (8.42)	-
Total number of arrests	7.2 (8.24)	-
Substance-related arrests	4.58 (6.54)	-
Months served (current sentence)	19.71 (30.33)	-
Convictions		
Theft	-	52 (44.1%)
Assault	-	41 (34.7%)
Breach of conditions	-	35 (29.7%)
Substance-related offence	-	28 (23.7%)
Weapons offence	-	24 (20.3%)
Murder	-	15 (12.7%)
Mischief	-	14 (11.9%)
Sex offence	-	10 (8.5%)
Obstruction of justice	-	10 (8.5%)
Fraud	-	9 (7.6%)
Criminal negligence	-	6 (5.1%)
Kidnapping	-	5 (4.2%)
Arson	-	3 (2.5%)

Note. Participants could be represented in more than one category in cases of multiple offences.

4. Results

To reflect the proposed goals stipulated in the introduction, the current dissertation incorporated latent class cluster analysis, survival analysis, and although latent variable path analysis was attempted, the model failed to converge. According to the power analysis tables presented by MacCallum, Browne, and Sugawara (1996), the obtained sample size for the planned structural equation modeling analyses (i.e., latent variable path analysis) resulted in an approximate power of only .50 (df = 36). Thus, the current sample size was insufficient to detect true findings in the data and was therefore not conducted. In lieu of latent variable path analysis, a canonical correlation analysis was completed. No formalized widely adopted power analyses for latent class cluster analysis or survival analysis have been established and little is currently known about sample size calculations in these analyses (Gudicha, Vermunt, & Tekle, 2013). This is due to the fact that power is dependent on the number of classes being fit, the variability and sensitivity of indicators, the degree of measurement error, and the overall size of the effect (Gudicha et al., 2013). However, a typical rule of thumb indicates that a sample size of 100 is poor, 200 is fair, 300 is good, 500 is superb, and 1000 is ideal (Comrey & Lee, 1992).

4.1 Data Conditioning

Prior to analysis, data were screened for univariate and multivariate outliers, and examined for normality. Univariate outliers were identified as values above three standard deviations from the mean. Although several demographic variables contained univariate outliers (i.e., total number of arrests, total substance-related arrests, frequency of substance use while incarcerated, and months served on the current sentence), these

values were non-discontinuous (i.e., no large gaps between values) and were retained. Self-Rated Inhalant Severity possessed two univariate outliers. Due to the low frequency of inhalant misuse, these values appeared extreme but reflect the target population and, therefore, were retained. Multivariate outliers were identified from a combination of Mahalanobis and Cook's distances and then removed from the analyses. Missing values on the personality questionnaires (i.e., all but the TLFB) were estimated using Expectation Maximization with 25 iterations. This method is an approach recommended when imputed variables are part of a model with latent variables (Dempster, Laird, & Rubin, 1977). Further, this model adds random error into the imputation process to increase validity (Dempster et al., 1977). Participants with missing data on the dependent variables were excluded pairwise from analyses. Finally, a total of 16.1% (*n* = 19) of the sample responded in an invalid manner on the MCMI-III or were missing more than 20% of their responses on the measures and, therefore, were excluded from subsequent analyses, the final sample size for statistical analyses was of 99 individuals.

4.2 Characteristics of the Sample

The means and standard deviations on both SUD and personality variables are presented in Table 4. Participants met probable diagnostic criteria for substance dependence in the year previous to incarceration for 2.22 classes of substances on average (*SD* = 1.28). A total of 9 participants (7.6%) did not meet criteria for a SUD, whereas 27.1% had a probable SUD in one class of substances, 23.7% in two classes, 18.6% in three classes, and 22.9% in all four classes. Participants reported an average age of 11.01 years (*SD* = 4.66) for first use across drug categories, with only one participant reporting first use after the age of 18 years, which occurred during

incarceration. Overall, on a scale of 1-9 (with 1 representing an absence of consequences and 9 reflecting severe consequences), participants self-rated the severity of their substance misuse, on average, at 6.38 (*SD* = 2.38).

Pertaining to substance use while incarcerated, on average, participants reported using substances on 22.19 occasions (*SD* = 50.66; range = 0-250) throughout their incarceration. The TLFB revealed that in the three months prior to study enrollment, 46.6% of participants reported not using any substances, whereas 41.6% of participants had used something. A further 11.9% did not disclose their institutional substance use. Furthermore, of those who did acknowledge substance use while incarcerated, 36.73% (15.3% of the total sample) used only contraband nicotine, whereas 63.27% (26.3% of the total sample) reported illicit substance use. Overall, institutional substance use consisted of the following prescription drugs: Dilaudid (3%), Methadone (2%), Seroquel (2%), Oxycontin (1%), Ritalin (1%), Remeron (1%), Morphine (1%), Sleeping pills (1%), Wellbutrin (1%), Valium (1%), and Dextromethorphan (1%). Regarding illicit substances, participants reported the use of: marijuana (24%), hashish (3%), LSD (1%), cocaine (1%), and D4 (stimulant for weight loss; 1%). In sum, the primary substances of use during incarceration among participants were marijuana, nicotine, and opioids.

4.3 Cluster Analysis

Goals one and two, which focus on distinguishing clusters of personality subtypes and associated mental health symptomatology, could be accomplished through the use of a variety of potential data reduction analyses (Burns & Burns, 2008). In cluster analysis, similarities on measures are used to cluster participants into more homogenous subgroups (Burns & Burns, 2008; Norusis, 2012). Cluster analysis is

typically used when group membership is unavailable a priori, which separates this method from discriminant function analysis (Burns & Burns, 2008; Norusis, 2012).

The three most common methods of traditional data clustering include two-step clustering, *k*-means clustering, or a hierarchical cluster analysis (Korusis, 2012). Two-step clustering is recommended with a large sample size (N = 1000) or a mixture of categorical and continuous data (Korusis, 2012). Alternatively, *k*-means clustering is suggested with a moderately sized data set and when the amount of clusters is to be decided *a priori* (similar to a confirmatory factor analysis). Hierarchical cluster analysis allows for the examination of solutions with increasing amounts of clusters in order to best establish the fit of the data to the relevant clusters (Burns & Burns, 2008; Korusis, 2012). Similar to factor analytic techniques, the appropriate number of clusters is then determined when discontinuity of coefficients between adjacent steps is large, as this indicates heterogeneity. Dendrograms and icicle plots are also used to visually determine the appropriate number of clusters for retention (similar to the scree plot in factor analysis; Burns & Burns, 2008; Korusis, 2012).

Contrary to traditional cluster analysis, which relies on subjective indicators in order to determine the correct number of clusters, latent class cluster analysis (LCCA) offers a model-driven approach to clustering (Bacher, Wenzig, & Vogler, 2004; Magidson & Vermunt, 2002; Vermunt & Magidson, 2002). A model-driven approach essentially results in a statistically based cluster that is less arbitrary in cluster identification than traditional clustering analyses (Bacher et al., 2004; Magidson & Vermunt, 2002). Further, traditional forms of cluster analysis typically underperform in the assignment of variable weighting when data are both continuous and categorical

(i.e., mixed-model clustering) compared to LCCA (Bacher et al., 2004; Magidson & Vermunt, 2002). LCCA also eliminates the need for standardizing variables or assumptions of equal variance and independence (Magidson & Vermunt, 2002).

LCCA provides a probability-based classification that generates a likelihood of cluster membership and misclassification that is then used to adjust parameter weights (Magidson & Vermunt, 2002). Specifically, the maximum-likelihood (ML) estimation method was used to define the parameters that determine the assignment of weights to different variables in order to maximize distinctions between clusters (Magidson & Vermunt, 2002; Vermunt & Magidson, 2002).

Several options are available in the determination of the number of clusters following the estimation of parameters (Magidson & Vermunt, 2002; Vermunt & Magidson, 2002). The chi-square goodness of fit values provide an absolute measure of model fit that is used to determine whether the final solution is a close approximation of the dataset (Lavery, 2011). The higher the value, the higher the model fit. However, more relevant are relative indices of fit, such as the Lo-Mendell-Rubin adjusted likelihood ratio statistic or the information criteria, as they allow for a comparison of the parsimony of the potential final models (Lavery, 2011; Magidson & Vermunt, 2002; Vermunt & Magidson, 2002). The most common statistics are the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC; Lavery, 2011; Magidson & Vermunt, 2002; Vermunt & Magidson, 2002). An AIC and BIC value is generated for each potential solution (e.g., two latent classes, three latent classes) and the solution with the lowest value is the most parsimonious solution (Lavery, 2011). Due to the fact that AIC and BIC are indices of parsimony, complex models (i.e., multiple clusters) are

punished even though there may be a theoretical rational for the presence of many clusters (Lavery, 2011). Therefore, the information criteria, the Lo-Mendell-Rubin statistic, and the chi-square goodness of fit values should be considered in the derivation of the final latent cluster solution, with increased weight placed on the former indices.

The results of the LCCA are presented in Table 5. It is important to note that while the four and five cluster solutions converged, a likelihood ratio chi-squared test could not be computed due to the limited sample size, which lowered the degrees of freedom to a level where the test could not be conducted. Therefore, in the current sample, only two or three cluster solutions were considered. The three cluster solution presented a higher maximum loglikelihood and associated chi-squared test. Furthermore, the AIC, BIC and sample size adjusted BIC were smaller in the three cluster solution, indicating increased parsimony. However, the Lo-Mendell-Rubin sample size adjusted likelihood ratio test was higher in the two cluster solution, although both were significant. Therefore, the three cluster solution improved upon a two class model. Finally, entropy values indicate the level of uniqueness between clusters. Higher entropy values are indicative of increased separation between clusters. In the current study, both models had excellent entropy values, which ranged between 0-1, with 1 indicating complete independence between clusters. For the three cluster solution, the estimated membership probability for Cluster 1 was 99.5%, for Cluster 2, 98.3%, and for Cluster 3, 96.6%. Therefore, the probability of incorrect cluster membership for Cluster 1 was 0.05%, Cluster 2 was 1.7%, and Cluster 3 was 3.4%. Overall, based on a consideration of all characteristics of the models, the three cluster solution was chosen.

Follow-up analysis of categorical variables associated with each cluster revealed that Cluster 1 was characterized only by a lack of opioid misuse or any other form of SUD (z = -2.74, *p* = .01), with 93.9% of individuals in this cluster not meeting criteria for opioid misuse, whereas Cluster 2 was characterized by both alcohol misuse (z = 1.15, *p* = .001, 75.9%) and a lack of sedative misuse (z = -1.19, p <.001, 76.7%). Finally, Cluster 3 was associated with a pattern of polysubstance misuse, namely: alcohol misuse (z = 3.15, p <.001, 95.9%), opioid misuse (z = 1.06, p =.002, 74.3%) and stimulant misuse (z = .07, p =.02, 67.3%).

Post-hoc tests with Games-Howell corrections for multiple comparisons were conducted to follow-up on continuous variables, as recommended by Kromrey and LaRocca (1995), due to the small sample size, unequal group sizes, and unequal error variances (i.e., violating assumption of homogeneity of variance). Differences between clusters on the LSRP are presented in Table 6, the MDMQ-R in Table 7, the SURPS in Table 8, and the MCMI-III in Table 9. Of note, all groups possessed similarly low levels of AS. Cluster 1 was characterized by the lowest levels of secondary psychopathy, little endorsement of any substance use motives, low levels of the personality vulnerabilities of I/H and IMP, and non-clinical elevations in comorbid antisociality, anxiety, major depression, and overall low substance misuse severity. Therefore, Cluster 1 was best labelled as the Mild group with a lack of opioid misuse and low levels of psychopathology. It is important to note that this was the smallest group, consisting only of 13 individuals, whereas Clusters 2 and 3 consisted of 45 and 41 individuals, respectively.

Cluster 2 was labeled the Moderate group because it was characterized by high alcohol misuse and low sedative misuse, with moderate levels of secondary psychopathy, moderate endorsement of all substance use motives, moderate levels of I/H, IMP and SS, and clinical elevations in comorbid antisociality, anxiety, and overall moderate substance misuse severity. Finally, Cluster 3 was conceptualized as the Severe group, with a polysubstance misuse pattern that consisted of alcohol, opioid and stimulants. Furthermore, this latter cluster possessed the highest levels of primary and secondary psychopathy, the strongest endorsement of all substance use motives, the highest levels of IMP, I/H, and SS, extreme elevations in comorbid antisociality, anxiety, substance misuse severity, and clinically elevated levels of major depression.

In a comparison of crimes committed by each cluster, Fisher's Exact test was interpreted in order to correct for low expected cell counts (Campbell, 2007). A trend emerged between the Mild (n = 0), Moderate (n = 3), and Severe (n = 8) clusters pertaining to mischief frequency on the Fisher's Exact Test ($\chi^2_{(2, N = 95)} = 5.12$, $p = .06$). The Mild (n = 3), Moderate (n = 2), and Severe (n = 12) clusters differed significantly in their frequency of weapons offences based on the Fisher's Exact Test ($\chi^2_{(2, N = 95)} = 10.61$, $p < .01$). Overall, the Severe group was convicted of significantly more weapons offences compared to the mild and moderate groups.

4.4 Survival Analysis

To address the predictive validity of the SURP typology as stipulated in the third goal, survival analysis was used to compare offender subtypes on their probabilities of engaging in institutional substance use during the retrospective three-month period. Survival analysis examines the influence of variables on the survival times (i.e., passage

of time) until an event occurs (i.e., substance use; Bewick, Cheek, & Ball, 2004; Ibrahim, Chen, & Sinha, 2005). The survival function is the probability of survival until time *x* (i.e., three months) and the hazard function is the conditional probability of the event occurring at time *x* after surviving to that time (i.e., current likelihood of using substances given survival to that point; Bewick et al., 2004; Ibrahim et al., 2005). Subsequently, one survival curve (survival function over time) was plotted for each group of interest and then was compared using the log rank test with a *p* critical value of .05 (Bewick et al., 2004; Ibrahim et al., 2005). The survival curves of the three different clusters (i.e., Mild, Moderate, Severe) of offenders were compared. Group membership was determined via the probability values obtained in the LCCA.

Both Allison (2010) and Copas and Farewell (2001) indicate that survival analysis is frequently completed on retrospective data, as long as event initiation times are known. The major limitations associated with retrospective data are the inability to infer causality and errors in recall (Allison, 2010; Copas & Farewell, 2001). However, the current study had participants report on the immediately preceding 90 days. This is contrary to typical epidemiological studies in which the retrospective timelines may span years, thereby limiting possible memory bias (Allison, 2010; Copas & Farewell, 2001). Copas and Farewell (2001) further note that analyzing retrospective data is only problematic if event times precede initial censoring time. Finally, the TLFB has demonstrated acceptable to excellent test-retest reliability over a three month period (Fals-Stewart et al., 2000; Norberg, Mackenzie, & Copeland, 2012).

A total of 94 participants provided data on the TLFB. In this model, nicotine use was considered censored (i.e., no use) as the underlying SURPS theoretical model does

not include nicotine use as a substance. A hierarchical Cox regression was conducted to ascertain the probability of institutional substance use among the LCCA derived groups. The initial step consisted of controlling for Security Level (Provincial, Minimum, Medium, Maximum) to account for potential differences in the availability of illicit substances. Overall, this step was non-significant ($\chi^2 = 4.27$, $p = .23$).

Step two consisted of the inclusion of the three LCCA clusters of Mild, Moderate, and Severe. This step was a significant change from the previous step ($\chi^2 = 7.04$, $p = .03$), indicating that cluster membership contributed significantly to the model. The median days until first use for both the Mild and Moderate group was 90 days and was 88 days for the Severe group. Overall, the high median number of days can be accounted for by the relatively small number of participants reporting use within the Mild ($n = 1$), Moderate ($n = 11$) and Severe ($n = 19$) clusters. However, the overall main effect of cluster membership on time to first use during the three month period of recall attained only the statistical level of a trend ($\chi^2 = 10.54$, $p = .06$). This main effect was driven by a trend for the Mild group to survive longer than the Severe group (Wald = 3.5, $p = .06$), with the Moderate group located between the two extremes (Wald = 2.17, $p = .14$; see Figure 2).

Step three consisted of the inclusion of the SURP personality variables in addition to the MDMQ-R substance use motives as predictors of time to first instance of institutional substance use. This step revealed a significant overall model effect for the broad combination of predictors ($\chi^2 = 24.3$, $p = .03$). Specifically, high SS postdicted time until engaging in institutional substance use (*ß* = .18, *Wald* = 4.74, $p = .03$) paired

with a trend for low AS to postdict time until engaging in institutional substance use (*ß* = -.17, *Wald* = 3.36, *p* = .07).

4.5 Linear Combinations via Canonical Correlation

In order to address the fourth goal which consisted of examining the relationship between substance misuse and criminal behaviour, structural equation modelling was expected to be used (Muller & Hanckock, 2008; Ullman, 2007). Structural equation modelling is both an exploratory and confirmatory statistical method used to compare measured data to a theoretical model in order to determine the extent to which the theoretical model fits the data and where modifications need to be made (Muller & Hancock, 2008; Ullman, 2007).

In the current study, due to the limited sample size, the model was underidentified, which resulted in a failure of the model to converge. Therefore, the underlying indirect relationships between the initially hypothesized manifest variables and latent variables could not be examined. Consequently, a canonical correlation was conducted to examine the direct relationship between two canonical variable sets, the SURPS personality variables and the previously hypothesized manifest variables (i.e., substance-related variables, criminal behaviour variables). Each significant linear combination is expressed as a Root (Tabachnick & Fidell, 2007).

Canonical correlations are used to determine and examine the linear combinations that have maximal relationships between two sets of variables. Canonical correlation analysis provides both canonical coefficients and structure coefficients. Canonical coefficients represent standardized weights capturing the relationship between the predictor and criterion variables (i.e., interpreted the same as beta weights

in a regression; Sherry & Henson, 2005; Tabachnick & Fidell, 2007). Tabachnick and Fidell (2007) indicate that canonical correlation coefficients of less than .30 should not be interpreted, as these represent a very small degree of overlap in variance. Furthermore, coefficients of .45 are typically considered fair, .55 are considered good, .63 is considered very good, and .71 is considered excellent (Comrey & Lee, 1992; Tabachnick & Fidell, 2007). However, the degree of continuity between coefficient loadings should also be considered in interpretation (Tabachnick & Fidell, 2007). Conversely, the structure coefficients are bivariate correlations between each observed variable and their canonical variate (i.e., interpreted the same as factor analysis loadings or the correlations between predictors and the criterion variable in a regression; Sherry & Henson, 2005; Tabachnick & Fidell, 2007). Therefore, relationships in a canonical correlation are typically interpreted by considering the structure coefficients as these correlations represent the amount of variance each variable can contribute to its canonical variate (Sherry & Henson, 2005). Cases with high structure coefficients and smaller canonical coefficients indicate multicollinearity with other variables loading on that variate (Sherry & Henson, 2005).

Canonical Variate X (i.e., the weighted sum of the variables) consisted of the SURPS personality variables of I/H, IMP, SS, and AS, whereas Canonical Variate Y consisted of Total Arrests, Criminal Versatility, MCMI-III Antisocial subscale score, Age at First Arrest, Total Drug Arrests, MCMI-III Alcohol Dependence subscale score, MCMI-III Drug Dependence subscale score, Self-Rated Substance Use Severity, and Age at First Use. The canonical analysis established which combination of variables

best related to SURPS personality variables through a linear combination of weighted measures.

The Wilks multivariate test was significant for Root 1 (*Wilks* λ = .46, $F(36,395) = 2.55$, $p = .001$) and Root 2 (*Wilks* λ = .68, $F(24,308) = 1.84$, $p = .01$), with small overall effect sizes of $R^2 = .33$ ($r_c = .57$) and $R^2 = .20$ ($r_c = .45$), respectively.

Pertaining to Root 1 (see Figure 3), the personality variables accounted for 40.09% of the variance in Canonical Variate X, whereas the manifest variables accounted for 34.39% of the variance in Canonical Variate Y. The relationship between the personality variables and Canonical Variate X was strong for IMP ($r = .83$) and I/H ($r = .77$), and moderate for SS ($r = .50$). The relationship between manifest variables and Canonical Variate Y was strong and positive for: MCMI-III Antisocial subscale score ($r = .88$), MCMI-III Drug Dependence subscale score ($r = .82$), and MCMI-III Alcohol Dependence subscale score ($r = .72$); moderate and positive for: Self-Rated Substance Use Severity ($r = .68$) and Criminal Versatility ($r = .53$); whereas the relationship was moderate and negative for: Age at First Use ($r = -.45$) and Age at First Arrest ($r = -.40$).

Conversely, in Root 2 (see Figure 4), the personality variables accounted for an additional 22.05% of the variance in Canonical Variate X, whereas the manifest variables accounted for an additional 8.21% of the variance in Canonical Variate Y. The relationship between the personality variables and Canonical Variate X was strong and negative for AS ($r = -.90$). The relationship between manifest variables and Canonical Variate Y was moderate and positive for Criminal Versatility ($r = .59$) and moderate and negative for Total Drug Arrests ($r = -.45$; see Table 10 and Table 11 for the complete canonical solutions).

In summary, across both Roots, the personality variables accounted for 62.15% of the variance in Canonical Variate X, whereas the manifest variables accounted for 42.6% of the variance in Canonical Variate Y. Specifically, increased levels of IMP, I/H and SS were associated with higher levels of antisociality, drug and alcohol dependence, self-rated substance use severity, criminal versatility, and younger ages at both first use and first arrest. In addition, lower levels of AS were associated with increased criminal versatility, but reduced frequency of drug arrests specifically.

Table 4

SUDs and Personality Characteristics

Sample Characteristics	*Mean (SD)*	*n* (%)
SUDs		
Alcohol Use Disorder	-	96 (81.4%)
Stimulant Use Disorder	-	71 (60.2%)
Opioid Use Disorder	-	60 (50.8%)
Polysubstance Use Disorder	-	63 (53.4%)
Sedative Use Disorder	-	35 (29.7%)
Personality		
Introversion/Hopelessness	14.96 (3.46)	-
Anxiety Sensitivity	12.35 (2.65)	-
Sensation Seeking	17.15 (3.04)	-
Impulsivity	12.29 (3.08)	-
LSRP Primary	35.39 (7.59)	-
LSRP Secondary	21.64 (4.62)	-
Motives		
MDMQ-R Enhancement	18.47 (5.41)	-
MDMQ-R Social	16.34 (5.52)	-
MDMQ-R Coping with Anxiety	16.27 (5.85)	-
MDMQ-R Coping with Depression	24.47 (10.72)	-
Psychopathology		
MCMI-III Antisocial	79.23 (18.59)	-
MCMI-III Anxiety	73.82 (29.85)	-
MCMI-III Major Depression	50.67 (29.86)	-
MCMI-III Alcohol Dependence	78.00 (20.66)	-
MCMI-III Drug Dependence	82.85 (18.80)	-

Note. LSRP Primary: selfish, uncaring, manipulative, etc.; LSRP Secondary: impulsive, self-defeating lifestyle.

Table 5

Latent Class Cluster Analysis Summary

	Total Cluster Categories			
LCCA Statistics	2 Cluster Solution	3 Cluster Solution	4 Cluster Solution	5 Cluster Solution
Maximum Loglikelihood	-6121.57	-6015.09	-5927.98	-5876.25
Likelihood Ratio Chi-Squared Value	38.9	40.05	*	*
Likelihood Ratio Chi-Squared *p* Value	p < .001	p < .001		
AIC	12351.14	12178.17	12043.97	11980.5
BIC	12500.75	12383.2	12304.41	12296.35
ADJ BIC	12330.05	12149.27	12007.25	11935.97
Entropy	.97	.95	.96	.97
Lo-Mendell-Rubin ADJ Likelihood Ratio Value	466.49	210.21	171.95	102.13
Bootstrap Likelihood Ratio *p* Value	p < .001	p < .001	p < .001	p < .001
Breakdown of Participants per Cluster (*n*)	23/76	13/45/41	13/13/35/38	7/15/36/11/29

Note. *Values could not be computed due to insufficient degrees of freedom; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; ADJ BIC = Sample size adjusted Bayesian Information Criterion.

Table 6

Games-Howell Post-Hoc Multiple Comparisons: Levenson Self-Report Psychopathy Scale (LSRP)

					95% Confidence Interval	
Variable	(I) Latent Class Cluster	(J) Latent Class Cluster	Mean Difference (I-J)	Std. Error	Lower Bound	Upper Bound
Primary	1	2	-2.18	1.76	-6.53	2.18
		3	-7.26**	1.85	-11.8	-2.71
	2	3	-5.08**	1.44	-8.51	-1.65
Secondary	1	2	-3.12*	1.05	-5.72	-0.5
		3	-8.07**	1.02	-10.62	-5.53
	2	3	-4.96**	0.7	-6.62	-3.3

Note. * $p < .05$ ** $p < .01$

Table 7

Games-Howell Post-Hoc Multiple Comparisons: Modified Drinking Motives Questionnaire Revised (MDMQ-R)

					95% Confidence Interval	
Variable	(I) Latent Class Cluster	(J) Latent Class Cluster	Mean Difference (I-J)	Std. Error	Lower Bound	Upper Bound
Enhancement	1	2	-9.22**	1.21	-12.26	-6.18
		3	-12.68**	1.17	-15.63	-9.72
	2	3	-3.46**	0.68	-5.07	-1.84
Social	1	2	-5.88**	1.11	-8.6	-3.15
		3	-9.37**	1.13	-12.14	-6.6
	2	3	-3.96**	0.94	-5.74	-1.25
Coping with Anxiety	1	2	-7.44**	0.83	-9.46	-5.41
		3	-13.83**	0.73	-15.64	-12.03
	2	3	-6.4**	0.72	-8.1	-4.69
Coping with Depression	1	2	-9.09**	1.32	-12.26	-5.91
		3	-23.83**	1.18	-26.7	-20.95
	2	3	-14.74**	1.26	-17.73	-11.75

Note. * $p < .05$ ** $p < .01$

Table 8

Games-Howell Post-Hoc Multiple Comparisons: Substance Use Risk Profile Scale (SURPS)

					95% Confidence Interval	
Variable	(I) Latent Class Cluster	(J) Latent Class Cluster	Mean Difference (I-J)	Std. Error	Lower Bound	Upper Bound
Introversion/	1	2	-1.81*	0.61	-3.31	-0.32
Hopelessness		3	-3.97**	0.74	-5.75	-2.19
	2	3	-2.16**	0.67	-3.76	-0.56
Anxiety	1	2	-1.15	0.83	-3.24	0.95
Sensitivity		3	-2.02	0.85	-4.16	0.12
	2	3	-0.87	0.5	-2.06	0.31
Impulsivity	1	2	-1.86*	0.75	-3.72	0.01
		3	-4.56**	0.73	-6.39	-2.73
	2	3	-2.70**	0.52	-3.93	-1.48
Sensation	1	2	.82	0.99	-1.68	3.31
Seeking		3	-1.10	0.97	-3.56	1.36
	2	3	-1.92**	0.55	-3.23	-0.60

Note. * $p < .05$ * $p < .01$

Table 9

Games-Howell Post-Hoc Multiple Comparisons: Millon Clinical Multiaxial Inventory Third Edition (MCMI-III)

					95% Confidence Interval	
Variable	(I) Latent Class Cluster	(J) Latent Class Cluster	Mean Difference (I-J)	Std. Error	Lower Bound	Upper Bound
Antisocial	1	2	-20.30**	5.97	-35.45	-5.18
		3	-34.29**	5.79	-49.12	-19.47
	2	3	-13.99**	2.61	-20.22	-7.77
Anxiety	1	2	-40.78**	9.07	-63.89	-17.67
		3	-55.81**	9.09	-78.96	-32.65
	2	3	-15.03**	4.66	-26.14	-3.91
Major Depression	1	2	-8.61	8.14	-29.03	11.82
		3	-29.67**	8.51	-50.82	-8.52
	2	3	-21.07**	5.89	-35.13	-7.00
Alcohol Dependence	1	2	-30.93**	5.56	-45.06	-16.81
		3	-46.59**	5.50	-60.6	-32.57
	2	3	-15.66**	2.55	-21.71	-9.6
Drug Dependence	1	2	-25.73**	4.61	-37.35	-14.1
		3	-39.26**	4.67	-50.99	-27.53
	2	3	-13.53**	2.67	-19.87	-7.19

Note. * $p < .05$ ** $p < .01$

Table 10.

Canonical Solution for SURP Personality Traits Predicting Behavioural Indicators of Substance Misuse and Antisocial Personality Disorder Symptoms for Root 1

Variable	Root 1		
	Canonical Coefficient	Structure Coefficient	Squared Structure Coefficient (%)
Canonical Variate X			
Introversion/Hopelessness	.53	.77	59.29%
Anxiety Sensitivity	.01	.29	8.41%
Impulsivity	.54	.83	68.89%
Sensation Seeking	.27	.5	25.00%
Canonical Variate Y			
Total Arrests	-.15	.03	0.09%
Criminal Versatility	.16	.53	28.09%
MCMI-III Antisocial	.63	.88	77.44%
Age at First Arrest	.02	-.4	16.00%
Total Drug Arrests	.01	.11	1.21%
MCMI-III Alcohol Dependence	-.04	.72	51.84%
MCMI-III Drug Dependence	.07	.82	67.24%
Self-Rated Substance Use Severity	.34	.68	46.24%
Age at First Use	-.22	-.45	20.25%

Table 11.

Canonical Solution for SURP Personality Traits Predicting Behavioural Indicators of Substance Misuse and Antisocial Personality Disorder Symptoms for Root 2

Variable	Root 2		
	Canonical Coefficient	Structure Coefficient	Squared Structure Coefficient (%)
Canonical Variate X			
Introversion/Hopelessness	.2	.01	0.01%
Anxiety Sensitivity	-.98	-.9	81.00%
Impulsivity	-.09	-.12	1.44%
Sensation Seeking	.42	.25	6.25%
Canonical Variate Y			
Total Arrests	.29	-.12	1.44%
Criminal Versatility	.81	.59	34.81%
MCMI-III Antisocial	-.61	-.09	0.81%
Age at First Arrest	-.04	-.2	4.00%
Total Drug Arrests	-.83	-.45	20.25%
MCMI-III Alcohol Dependence	-.05	-.23	5.29%
MCMI-III Drug Dependence	.49	.05	0.25%
Self-Rated Substance Use Severity	-.3	-.25	6.25%
Age at First Use	-.04	-.12	1.44%

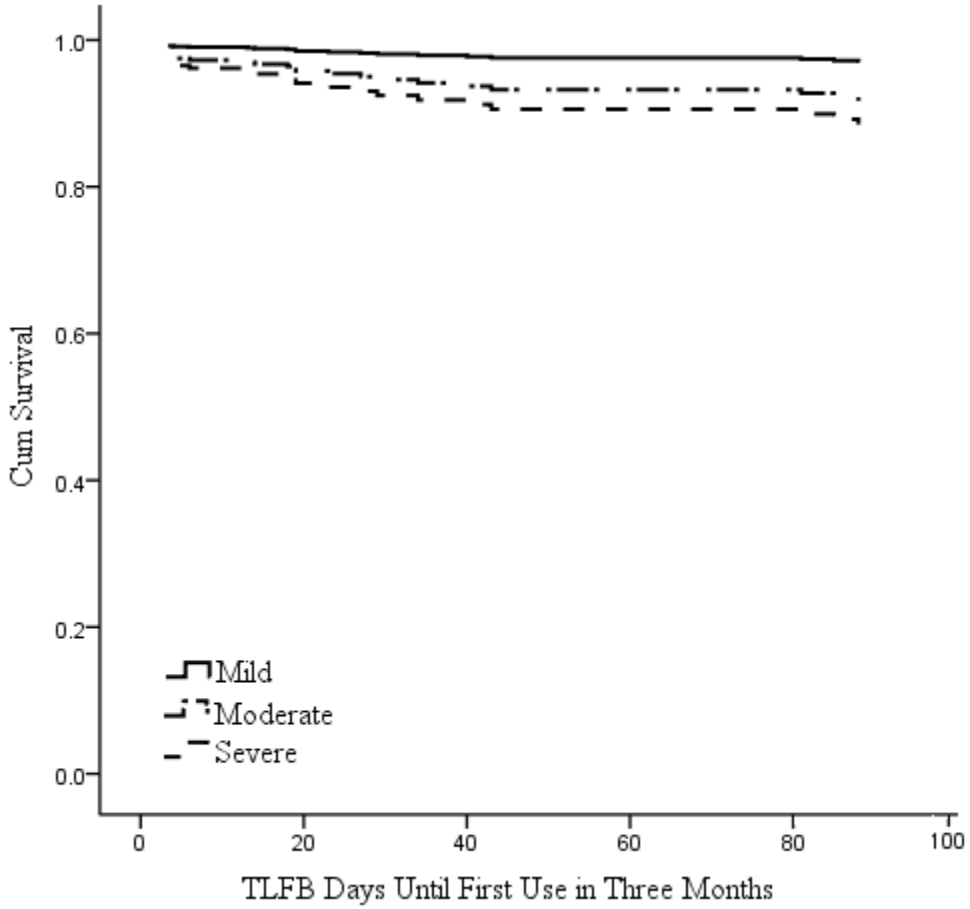


Figure 2. Survival function for Cluster 1 (Mild), Cluster 2 (Moderate) and Cluster 3 (Severe), consisting of the cumulative survival percentage based on days until first use (i.e., time).

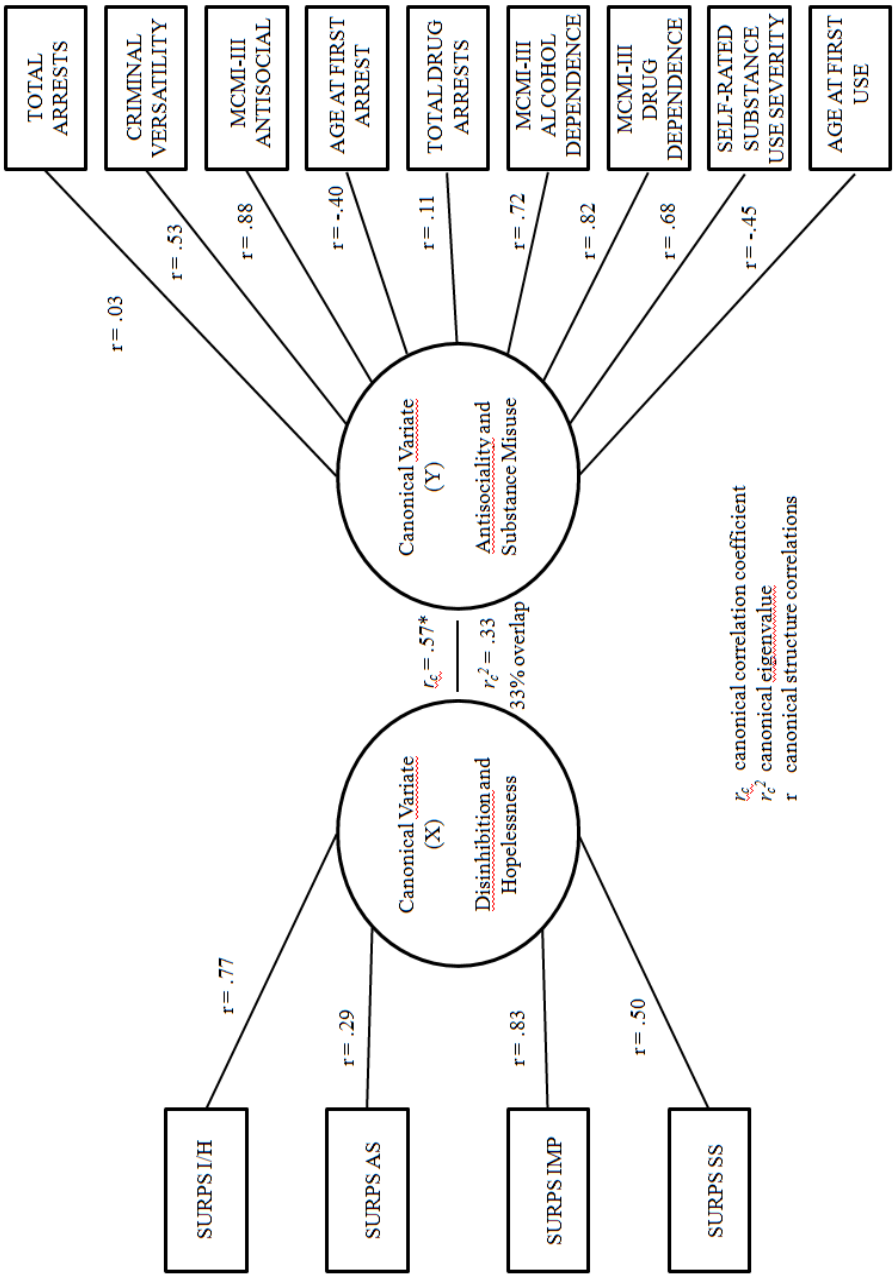


Figure 3. Canonical model representing the optimal linear combination of variables and their degree of overlap in Root 1.

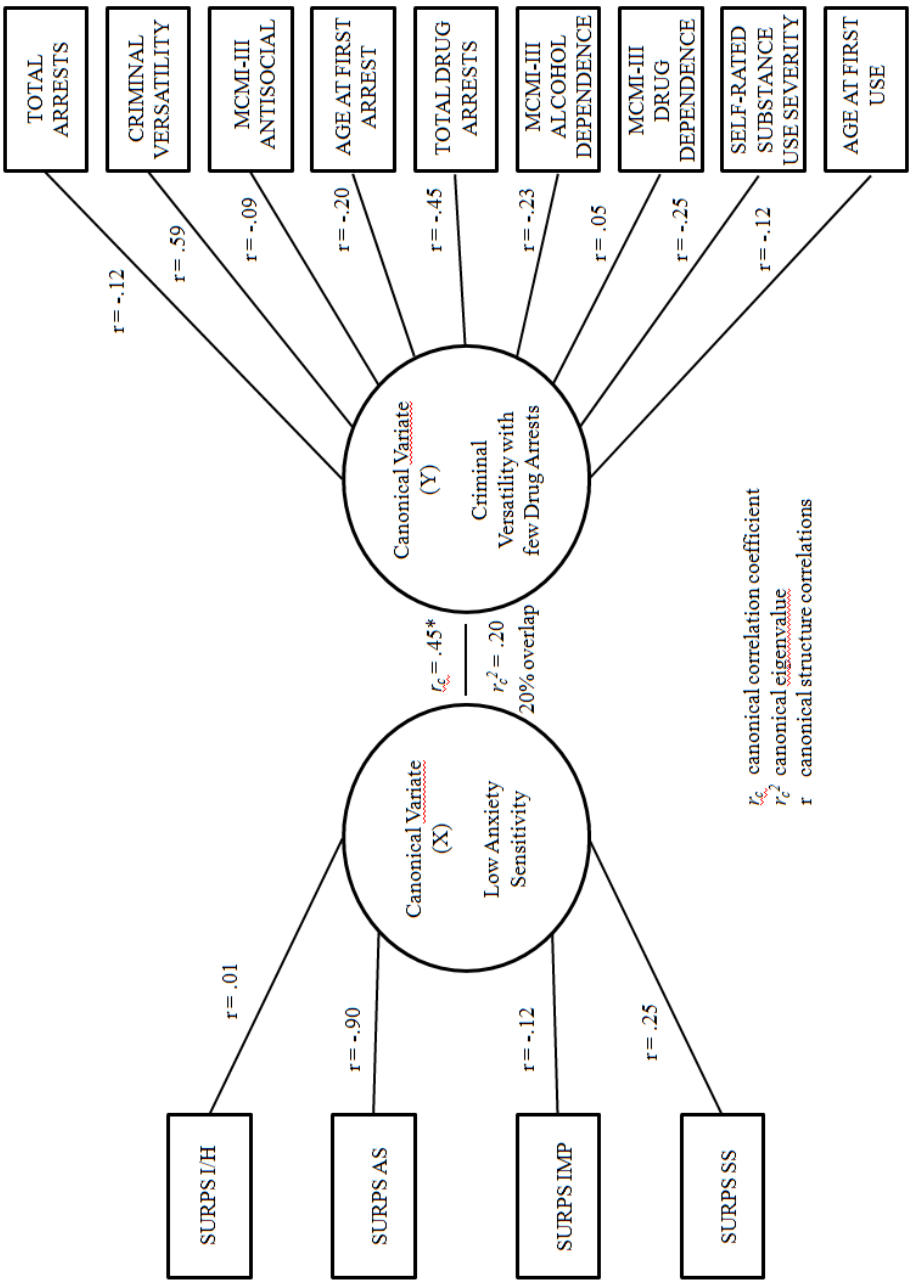


Figure 4. Canonical model representing the optimal linear combination of variables and their degree of overlap in Root 2.

5. DISCUSSION

The current dissertation attempted to address three primary goals. The first goal was twofold: the validation of the SURP personality model in a male offender sample and to determine whether any revisions to the SURP typology were required in order to capture the unique characteristics of this sample. The second overarching goal was to explore the ability of the SURP model to postdict retrospective recall of offender institutional substance use over a three-month period. The final goal of the current dissertation was to increase theoretical understanding of the relationship between SUDs and criminal behaviour. These goals are essential to address, given that the rates of SUDs are significantly higher in offenders than in the general population (Brink, 2005; Fazel et al., 2006). Furthermore, treatment resistance among offenders highlights the need to enhance conceptualizations of offender diversity, in order to develop interventions which better address their needs and, ultimately, may reduce both criminal behaviours and SUDs. Indeed, preliminary evidence revealed that interventions matched to unique personality vulnerabilities from the SURP model have been more effective in reducing both substance use and comorbid psychopathology than generic interventions (Castellanos & Conrod, 2006; Conrod et al., 2010; Conrod et al., 2000b).

The prevalence of SUDs demonstrated in the current sample of provincial and federal offenders is staggering. Although 27.1% met criteria for a SUD in one category, approximately 65% met criteria for a SUD in two or more categories, indicating that the majority of offenders have a polysubstance pattern of misuse. The most prominent categories of SUDs were, in descending order: alcohol, stimulants, opiates, and sedatives. This pattern of findings mirrors those of Hopley and Brunelle (2012), who

reported similar prevalence of SUD categories in a correctional sample in the same province as the current sample. Furthermore, these rates align with U.S. and international reviews which have identified that 18-30% of male offenders have an alcohol use disorder and 10-48% have a drug use disorder, with overall rates of above 50% of forensic samples having SUDs (Fazel et al., 2006; Kraanen, Scholing, & Emmelkamp, 2009; Wilson, Draine, Hadley, Metraux, & Evans, 2011). In a recent study of approximately 31,000 Canadian provincial offenders, 33% presented with a SUD within the last five years (Rezansoff, Moniruzzaman, Gress, & Somers, 2013). This contrasts significantly with lifetime prevalence reports of SUDs in the general population at around 9-15% (Anthony et al., 1994; Canadian Centre on Substance Abuse (CSSA), 2004; CSSA, 2005; Grant, 2009; Health Canada, 2011; Kessler et al., 2005). Furthermore, 23.7% of offenders in this combined sample reported incarceration for a substance-related crime. These results mirror broader statistics reporting that approximately 25% of federal offenders are either currently incarcerated for, or are on parole for substance-related charges (CSC, 2006; Grant et al., 2009; Motiuk & Vuong, 2005). Of note, the average age of onset for substance use was 11 years old in the current sample, and participants rated the overall mean severity of substance use problems as six out of nine on a Likert scale. This reflects the serious nature of substance misuse in this population. The increased likelihood of comorbid physical and mental health concerns in substance misusers, in addition to the associated societal and economic costs, reaffirm the importance of elucidating the factors that contribute to the relationship between SUDs and criminal behaviour and targeting these in interventions

(Kessler et al., 2005; Langas et al., 2011; Laslett et al., 2011; Rehm et al., 2006; Strang et al., 1998).

Novel to the present dissertation are current statistics on the rates of institutional substance use in both provincial and federal offenders. Overall, participants reported using substances on an average of 22 different occasions during their current sentence. Furthermore, in the three month period prior to study enrollment, less than half of participants (46.6%) had abstained from institutional substance use, whereas 41.6% of participants used substances on at least one occasion. However, approximately 12% chose not to disclose on their institutional behaviour. Therefore, the latter statistic may reflect a slight underestimate of the proportion of offenders who engage in institutional substance use, to a modest degree. Nicotine accounted for approximately 35% of the reported institutional use, followed by marijuana, hashish, Dilaudid, Methadone, Seroquel, and Oxycontin. These findings contrast significantly with the results of institutional urine screen results. Specifically, CSC (2004) and MacPherson (2001) reported that between 11-12% of offenders have positive urine screens on an annual basis, primarily testing positive for cannabis or opiates. These results suggest the current rates may be three times higher than these biological screens suggest. This disparity may be accounted by the fact that urine screens are completed randomly on 5% of the offender population on a monthly basis and do not capture nicotine use (MacPherson, 2001). Despite significant institutional attempts to curb the availability of substances within institutions, a significant number of offenders have access to, and are using substances. An increased ability to identify groups of individuals at risk for institutional substance misuse is essential.

5.1 Validation of the SURP Typology (Goals 1 & 2)

A central objective of the current dissertation was to validate the SURP typology in a male forensic sample and determine if any modifications to the original model were necessary. It was hypothesized that: (1) high AS would cluster with anxiety disorder symptoms, alcohol and sedative use disorders, and the use of these substances for coping with anxiety; (2) high I/H would be associated with mood disorder symptoms, alcohol and opioid use disorders, and coping with depression motives; (3) high SS would be uniquely clustered with an alcohol use disorder and the enhancement motive for substance use; and finally (4) high IMP would be linked to antisocial personality disorder symptoms, stimulant and polysubstance use disorders, and all motives for substance use. Furthermore, in order to capture the specific characteristics of a correctional sample, it was hypothesized that: (1) IMP would be the most prevalent subtype, associated with antisocial personality disorder symptoms, early onset of substance use, and illicit institutional substance use; (2) a low AS cluster would emerge, associated with high psychopathy, an opioid use disorder, and both enhancement and coping motives for substance use; and (3) the low AS cluster would be positively linked to internalizing symptoms and negatively with externalizing symptoms.

Contrary to the aforementioned hypotheses, a cluster solution based on the SURP typology failed to emerge. Instead, a three cluster solution emerged, characterized by a differential profile of SUDs, comorbid psychopathology, and overall symptom severity. Specifically, the first cluster was remarkable for the lack of opioid use disorder or any other form of SUD, whereas cluster two was linked to alcohol use disorders, but a lack of sedative use disorder. Finally, the third cluster was characterized by a pattern of

polysubstance misuse, namely alcohol, opioid, and stimulant use disorders. The first cluster was labelled the Mild group, as this group demonstrated the lowest levels of secondary psychopathy (i.e., antisocial lifestyle factors), the fewest endorsed substance use motives, low levels of I/H and IMP, and non-clinical elevations in antisociality, anxiety, major depression, and low overall substance misuse severity. This cluster was also the smallest, accounting for only 13% of the sample. The Moderate cluster had moderate levels of I/H, IMP, and SS elevations, and clinical elevations in comorbid antisociality, anxiety, and substance misuse severity. Finally, the Severe group revealed the highest frequency of SUDs, and highest levels of IMP, I/H, and SS, psychopathy, the broadest endorsement of substance use motives, extreme elevations in comorbid antisociality, anxiety, substance use severity, and major depression. The frequency of weapons offences and a trend for increased mischief convictions rose with cluster severity. Although a unique low AS cluster did not emerge, all groups exhibited equally low levels of AS.

The lack of sedative use disorders evident in all clusters partially supports the aforementioned hypotheses, as sedative misuse tends to be associated with high levels of AS, opposite to the low levels found in the current sample (Conrod et al., 2000a; Hearon, Calkins, Halperin, McHugh, Murray, & Otto, 2011). Furthermore, elevated levels of AS are more common among females than males, which may explain the presence of a high AS group in the original SURP studies which were based on females, and the absence of that group herein (Conrod et al., 2000a; Conrod et al., 2000b; Hearon et al., 2011). A body of evidence supports a relationship between low levels of AS and externalizing behaviour. Specifically, it has been found that low anxiety and fearlessness

is a central feature captured by the PCL-R, which is the gold standard of psychopathy assessment (Neumann, Johansson, & Hare, 2013). Individuals who engage in antisocial behaviours have been found to exhibit low baseline arousal levels (Sijtsema et al., 2010) and respond to difficult tasks with normal physiological arousal, but have little internal recognition of this arousal (Lilienfeld & Penna, 2001). Therefore, it has been suggested that if physiological arousal is poorly processed in conjunction with antisocial attitudes, then there is a failure to inhibit behaviours that violate social norms (i.e., criminal behaviours) may follow (Lilienfeld & Penna, 2001). Further, in a youth sample, low AS has been linked to increased attitudes towards social deviance (Nebbitt, Lombe, & Williams, 2008). Therefore, the low levels of AS across clusters may reflect the fact that the entire sample represents a group presently incarcerated for violating social norms and clearly defined laws, sometimes repeatedly.

The emergence of a typology characterised by high levels of symptom severity can be interpreted in light of previous research. Wareham, Dembo, Poythress, Childs, and Schmeidler (2009) developed a typology incorporating psychopathy, anxiety, and several externalizing indices (i.e., substance use, angry and impulsive behaviours, a loss of control, oppositional behaviour, restlessness, and criminal offending/recidivism) in a sample of both male and female youths in a diversion program. Four subtypes, characterized by differing levels of severity and comorbidity, emerged from a latent class factor analysis, namely: 1) a high psychopathy and externalizing problem group, with low anxiety (Psychopath-like class); 2) a group with moderate elevations in psychopathy and externalizing problems, also with low anxiety (Impulsive class); 3) a high anxiety with moderate elevations in comorbid psychopathy levels and externalizing

problems (Impulsive-Anxious class); and finally, 4) a low psychopathy, anxiety, and externalizing problems group (Non-psychopathic class). One noteworthy distinction between this typology and the current findings is the inverse proportions between the Non-psychopathic class (62%) and Psychopath-like class (7%) in the youth model. These results contrast with the smaller proportion of Mild cases (13%) and large number of Severe cases (41%) in the current cluster solution. This may be accounted for by the higher proportion of individuals with psychopathic traits in provincial and federal institutions versus those in diversion programs, distinctions between youth and adult samples, and that the current model captures those individuals with a life course persistent pattern of offending (Moffitt, 1993). Therefore, it is possible that the youth from clusters 1 and 2 in Wareham and colleagues' (2009) study consist of the same individuals representing the moderate and severe clusters found in the current investigation. The finding of low levels of anxiety in the more severe youth clusters in Wareham et al.'s (2009) also supports the documented link between low AS and externalizing behaviour (Hearon et al., 2011; Lilienfeld & Penna, 2001; Nebbitt et al., 2008; Neumann et al., 2013). In sum, the Wareham (2009) findings highlight the fact that elevated levels of IMP and low AS may represent stable and long-term indicators of risk for both SUDs and criminal recidivism. In the current sample, IMP was a robust contributor to the level of psychopathic traits, degree of antisociality and antisocial behaviours (i.e., weapons offences, criminal versatility, younger ages at first use and first arrest), levels of depression and anxiety, and substance misuse severity within the cluster and canonical correlation analyses.

A further salient feature of these results is that the Mild, Moderate and Severe clusters derived from the analyses strongly echo the RNR model of offender assessment and rehabilitation initially developed by Andrews and colleagues (1990). The RNR model is founded on the principle of treatment matching based on overall risk level, criminogenic needs, and responsivity factors (Andrews & Bonta, 2010). The results of the current dissertation indicate the presence of three separate risk level categories with increasing severity of substance use and the aforementioned indices of antisocial behaviour. The identified non-statistically significant trend towards postdictive differences in institutional substance use based on cluster severity is also suggestive of incremental risk. In addition, these results reveal the presence of groups of offenders with distinct levels of criminogenic needs related to the frequency and severity of substance misuse and antisocial behaviour patterns. Furthermore, such distinctions may benefit from being considered as responsivity issues. As such, the significant differences in antisocial personality disorder symptoms and levels of psychopathy found between groups of participants are prominent responsivity issues, as the associated behaviours (e.g., manipulation, shallow affect) typically affect treatment planning and response (Olver, Stockdale, & Wormith, 2011; Wong, Gordon, & Gu, 2007). Hence, the results of the present study may serve to inform SUD treatment under the RNR model. Specifically, although a minority of offenders appear to only require low levels of institutional programming addressing the criminogenic needs measured herein (i.e., antisocial behaviours/attitudes and substance use), the majority of participants may benefit from moderate to intensive services. Furthermore, rehabilitation services should emphasize the targeting of antisocial traits and substance misuse as core components of

intervention. The differences in the SURP personality model across the three clusters of offenders may further inform how substance misuse intervention is approached with this population.

CSC is currently transitioning to the Integrated Correctional Program Model, which continues to be based on the RNR model, but combines 38 national correctional programs into three: (1) a Multi-Target Program, (2) a Sex-Offender Program, and (3) an Aboriginal-Specific Multi-Target Program (McDonough, 2009). Furthermore, only moderate and high intensity interventions will be offered to incarcerated offenders, with a low risk program of 25 sessions offered in the community (McDonough, 2009). The multi-target program now includes: anger management, cognitive living skills, substance abuse, the violent offender program, and the family violence program. The removal of low intensity programming and offering of multi-target programs will increase the heterogeneity of offenders within groups and possibly increase the difficulty of individualizing treatment based on those criminogenic needs and responsivity factors unique to each individual. The results of the current study reaffirm the variability in risk levels and needs of offenders and suggests that the SURP personality model may be used to identify individual vulnerabilities and offer concrete treatment targets.

Specifically, the clusters demonstrated varying levels of I/H, SS and IMP. Pertaining to I/H, negative mood states, such as hopelessness, have been considered as dynamic risk factors, which may lead to increased deviant fantasizing among sex offenders, and have been linked to higher rates of recidivism more generally (Jeglic, Mercado, & Levenson, 2012; Martin & Stermac, 2010). Increased hopelessness may be

attributed to actual and perceived negative consequence and restrictions both during and after a period of incarceration, such as residence restrictions (Jeglic et al., 2012). For this reason, it is not surprising that the more severe cluster in our analysis also exhibited the highest levels of I/H. Severity was also incrementally related to higher levels of SS. SS correlates moderately and positively with criminal behaviour in both adolescents and adults (Zuckerman, 2007). Furthermore, SS levels have been shown to be predictive of future criminal behaviour, potentially due to a combination of boredom proneness and a need for excitement (Zuckerman, 2007). High levels of SS also predict the perpetration of violence after one year among high risk youth, albeit with an overall small effect (Sussman, Simon, Dent, Steinberg, & Stacy, 1999). Moreover, in the current study, SS postdicted time until engaging in institutional substance use over the three month retrospective period. Although SS and IMP are sometimes considered interchangeable terms, structural equation models appear to support their distinction (Carlotta, Borroni, Maffei, & Fossati, 2011; Castellanos-Ryan & Conrod, 2011; Finn et al., 2000; Krueger et al., 2007). For example, Carlotta and colleagues (2011) found that SS and IMP were two distinct constructs that respectively explained 27% and 44% of the variance in delinquency among a sample of adolescents. Indeed, IMP is perhaps the most central predictor of antisocial behaviour in both adolescents and adults. Youth higher in IMP have been found to be at increased risk for both violent (i.e., sexual or non-sexual) and non-violent recidivism, arrests, or parole violations (Miner, 2002; Roberts & Erikson, 1974; Worling, 2001). The findings are similar for adults, as individuals higher in IMP are more likely to recidivate violently compared to offenders with lower levels of IMP (Dejong, Virkkunen, & Linnoila, 1992; Prentky, Knight, Lee, & Cerce, 1995). High

IMP offenders have been shown to be four times more likely to commit nonsexual or victimless crimes than offenders with lower levels of IMP (Prentky et al., 1995). Moreover, IMP levels can predict institutional breaches and criminal convictions in the community and can distinguish between offenders and non-offenders, although in the current dissertation SS was associated with institutional substance use (Gordon & Egan, 2011). Furthermore, high IMP is associated with an increased likelihood of ceasing treatment prior to completion, which has been tied to recidivism (Moeller, Dougherty, Barratt, Schmitz, Swann, & Grabowski, 2001; Olver et al., 2011). The role of IMP in previous research predicting substance misuse and criminal behaviour may be partially accounted for by the mediating role of executive functions. Indeed, behavioural disinhibition is associated with a reduced working memory capacity, which is necessary for effective problem-solving and to keep behavioural norms in mind during actions (Bogg & Finn, 2010).

Given the link between high I/H, SS, and IMP and higher severity of substance misuse and antisociality in our sample, current institutional programs should focus on addressing these personality traits. This is especially relevant as the comorbidity between substance misuse and antisocial personality disorder has been linked to an increased risk for antisocial behaviours and criminal recidivism, as seen in the Severe group herein (Fridell et al., 2008; Howard, McCarthy, Huband, & Duggan, 2013). Therefore, among those categorized in the Mild group, a short-term low intensity intervention relevant to low AS cases (discussed in section 5.4) would likely be most appropriate. Otherwise, a low intensity intervention targeting RNR specific criminogenic needs would be the only recommended intervention. The Moderate group

would likely benefit from programming at moderate intensity, which centers on alcohol misuse, antisociality, and a combination of short-term I/H, SS, and IMP focused personality interventions. The Severe group would benefit from a high intensity intervention specifically addressing antisociality, I/H, SS, IMP, and psychopathy. This is especially relevant due to the limited success rates in relapse prevention for current forms of treatment, such as: Alcoholics Anonymous, motivational enhancement, aversion therapy, cognitive behavioural therapy and psychodynamic (Imel et al., 2008; Ness & Oei, 2005).

Contrary to the initial hypotheses, the three identified clusters do not appear to require individualized personality interventions. Rather, differing intensities for all personality interventions are likely required by each group to reduce the risk of recidivism and curtail SUDs. In a similar vein, the motivational components of using substances for Enhancement, Social reasons, Coping with Anxiety and Coping with Depression should also be addressed with the moderate and high intensity clusters. However, cluster membership was not associated with particular motives, nor was any one motive more common. Instead, the degree of reliance on each motive rose in parallel with overall personality vulnerabilities and symptom severities. Finally, though the SURPS questionnaire was unable to distinguish between the clusters of offenders, this brief measure could still be incorporated into the assessment of institutionalized offenders in order to further tailor treatment programs by adding brief components to address personality vulnerabilities to criminogenic needs (e.g., IMP as a component of antisocial personality disorder, antisocial behaviours, and SUDs). These brief personality interventions also may be offered in the provincial correctional system,

where programming is currently lacking (Kitchin, 2005). Accounting for heterogeneity is essential, as the Project MATCH results revealed that matching treatment to unsuitable matching indicators results in modest effects at best, whereas matching interventions to individual vulnerabilities is more successful (Allen et al., 1998; Babor & Del Boca, 2003; Berglund et al., 2003; Conrod et al., 2000a; Hopley & Brunelle, 2012; Rist et al., 2005; Setiawan et al., 2011).

The latent class cluster solution also revealed that the clusters present with unique mental health needs. Specifically, individuals in the Mild group do not appear to require concurrent mental health treatment given the non-clinical elevations in mental health symptomatology. Conversely, offenders in the Moderate group presented with clinical levels of anxiety disorder symptoms. Unsurprisingly, offenders in the Severe group presented with extreme elevations in both Anxiety and Major Depressive disorder symptomatology. The provision of care, which concurrently integrates treatment for SUDs and other mental health disorders, is currently evidence-based best practice, resulting in improved outcomes for both mental health and addiction symptoms (Clearly et al., 2008; Drake et al., 2001; Kessler, Nelson, McGonagle, Edlund, Frank, & Leaf, 1996; Rush & Keogl, 2008). Furthermore, integrated programs reduce the likelihood of alcohol and drug relapse following treatment (Marlatt & Witkiewitz, 2005). Symptom severity, hospitalization, and level of impairment are also decreased in individuals with both a substance use and another mental health disorder, pointing to the importance of integrated treatment (Drake, Mercer-McFadden, Mueser, McHuge, & Bond, 1998). Integrated treatment improves both the SUD and comorbid condition, which is

especially important since a guarded prognosis is the standard assumption with concurrent disorders (Clearly et al., 2008; Hesse, 2009).

In his influential paper, Gibbons (1975) stipulated that in order for typologies to be worthy of scientific attention, they should meet the following four criteria. First, he indicated that individuals should be assigned independently and objectively. Although latent class analysis classifies cases independently, further examinations will ascertain whether the model is reliable and replicable. The second criteria stipulated that the categories must be mutually exclusive without overlap. Further, each grouping should have a theoretical underpinning. In the current model, the high entropy value of .95 was indicative of nearly independent clusters. The cluster solution is also mirrored in the RNR model, which theorizes differing levels of severity based on risk, needs, and responsivity factors (Andrews & Bonta, 2010). In the current typology, each group was typified by unique severity levels on various indices of risk, needs and responsivity factors, matching the theoretical model of RNR. However, due to the fact that the clusters were not defined solely by unique pairings of personality vulnerabilities and use of specific substances as stipulated in the SURP model, no firm conclusions regarding the replication of this typology can be drawn. Nevertheless, the current model improves upon previous typology of substance users, such as those presented by Jellinek (1960) and Cloninger (1987a), because of the use of a strongly grounded theoretical foundation. The third typology criteria presented by Gibbons (1975) related to the comprehensiveness in categorization; that is, individuals should largely be classifiable (Gibbons, 1975). The correct classification probabilities of the identified three cluster model ranged from 96.6 to 99.5%, indicating a low likelihood of individuals being

incorrectly classified or classified into multiple groups. Finally, in light of early typologies that were overly comprehensive, Gibbons (1975) emphasized the importance of parsimony. In the current dissertation, the AIC and BIC criteria (parsimony indices) were lowest in the three cluster solution, indicating that the most parsimonious solution was chosen. Finally, the predictive validity of typologies is frequently overlooked, but it is a fundamental component for a typology to have any practical applications (Byrne & Roberts, 2007; Gibbons, 1975). Therefore, an additional goal of the current dissertation was to assess the predictive validity of the current typology, which will be reviewed in detail below.

5.2 Predicting Institutional Substance Use (Goal 3)

A central goal of the present dissertation was to determine whether the SURP typology had predictive validity regarding offender substance use during incarceration. Two hypotheses were formulated. First, it was expected that the high IMP cluster would have an increased probability of engaging in self-reported substance use compared to the other clusters. Second, the high IMP group was expected to engage in self-reported institutional substance use sooner than the other identified clusters.

Due to the fact that a SURP typology did not emerge as hypothesized, these hypotheses were not directly examined. Rather, survival analysis was used to determine if offender subtypes (based on cluster membership) could postdict time until institutional substance misuse. Overall, security level did not influence the probability of engaging in institutional substance use. Furthermore, there was a trend for cluster membership to contribute to the Cox regression model, driven by a tendency for the Mild group to survive longer (i.e., shorter time to substance use) than the Severe group,

with the Moderate group clearly situated between the two. The final step consisted of an examination of individual variables in the postdiction of time until institutional substance use. Specifically, increased levels of SS were associated with reduced time until engaging in institutional substance use. Additionally, there was a trend for low AS to postdict time until use. However, no substance use motives emerged as unique postdictive variables.

Several previous studies, have demonstrated that SS is a strong predictor of substance use, including one longitudinal study following grade 9-10 students over a four year period (Horvath, Milich, Lynam, Leukefeld, & Clayton, 2004). Horvath and colleagues (2004) discovered that SS and substance use have a reciprocal causal relationship, whereby high levels of SS were predictive of substance use four years later, and vice versa. Therefore, substance use was linked to future personality (i.e., SS) change, which leads to increased substance use (Horvath et al., 2004). Within a forensic sample, the SS domain of *interest in stimulating and exciting experiences* was a significant contributor to the prediction of drug and poly-substance dependency, but not alcohol dependence (Ireland & Higgins, 2013). This is possibly accounted for by the fact that individuals high in SS have a higher need for excitement, increased boredom proneness, and limited tolerance for monotony (Sarchiapone et al., 2009; Zuckerman, 2007). Therefore, incarcerated offenders high in SS may be motivated to relieve boredom and derive excitement and stimulation by engaging in institutional substance use.

The trend finding that low AS was postdictive of institutional substance use requires replication prior to drawing strong conclusions or recommendations. With

consideration of this caveat, in an undergraduate sample, Wagner (2001) discovered that high SS predicted substance use, and also found a negative correlation between AS and substance use, indicating that a combination of high SS and low AS is linked to increased substance use. Furthermore, low AS has been found to mediate the relationship between psychopathy and opioid dependence within a correctional sample (Hopley & Brunelle, 2012). This was hypothesized to be the result of low AS being associated with a reduced sensitivity to punishment. A reduced sensitivity to punishment has also been linked to increased subscale scores on the interpersonal-affective factor of psychopathy (Wallace, Malterer, & Newman, 2009). This is supported by the current findings of increased LSRP Primary subscale scores being associated with increased SUD severity in the current dissertation. Furthermore, according to Woicik and colleagues (2009), AS is a lower order dimension of Gray's (1987) Behavioural Inhibition System within the Reinforcement Sensitivity Theory. Gray's (1987) theory posits that this inhibition system is associated with withdrawal behaviours in response to punishment. As discussed, low AS may contribute to a failure in inhibition of behaviour resulting in negative consequences (Lilienfeld & Penna, 2001). Therefore, individuals with low AS may be more likely to engage in the risk taking behaviour of institutional substance use, due to a reduced sensitivity to punishment, opposite to individuals high only in I/H.

There is no doubt that the ability to identify offenders with increased risk for violent and non-violent behaviours during incarceration is highly desirable (Cunningham, Sorensen, Vigen, & Woods, 2011). This would allow correctional institutions to more effectively allocate resources for both security and monitoring,

resulting in overall cost savings (Cunningham et al., 2011; Gendreau, Goggin, & Law, 1997). Of note, the majority of studies on institutional misbehaviour are of a correlational nature and cluster analyses typically lack an assessment of predictive validity following classification (Berk, Kriegler, & Baek, 2006). Despite the lack of research on this topic, current estimates from the United States indicate that 15% of offenders engage in institutional misconduct, ranging from delaying stand-to count, to possession of controlled substances, to assault or homicide (Berk et al., 2006). In addition, Jiang (2005) found that substance use violations occurred significantly less frequently than non substance-related infractions over a one month period. However, Jiang (2005) also discovered that for every category of drug use (e.g., stimulants, alcohol) reported by participants prior to incarceration there was a 14% increase in the rate of institutional substance use during the same time period. This finding may partially explain the high substance use infractions in the current sample, as a majority of participants met criteria for multiple SUDs prior to their incarceration.

Research on predictors of institutional misconduct has primarily focused on demographic variables (Gendreau et al., 1997; Walters & Crawford, 2013). Several early studies have noted that within the correctional environment, younger age was consistently regarded as the strongest predictor of institutional misconduct, followed by unstable work history, marital status (i.e., unmarried), and low educational attainment (Flanigan, 1983; Goetting & Howsen, 1986). Furthermore, a history of drug-related problems was found to be predictive of misbehaviour (Flanagan, 1983), although this finding was not always replicated (Goetting & Howsen, 1986). Increased levels of SS have been linked to both incarceration and increased rates of institutional violence

(Brunelle et al., 2009; Morey, 2003). Furthermore, Brunelle and colleagues (2009) discovered that among female offenders, a stimulant use disorder partially mediated the relationship between SS and incarceration, indicating that the women sampled may use this category of drug in a problematic manner. Therefore, the problematic pattern of use is likely to continue while incarcerated, and may partially account for the relationship between SS and institutional substance use. Increased levels of SS have also been correlated to both general (including institutional substance use; r = .20) and aggressive (i.e., verbal and physical aggression; r = .23) institutional infractions in a female offender sample (Skopp, Edens, & Ruiz, 2007). However, the direct correlation between SS and substance-related infractions among male offenders has been minimal in past research (r = .05), despite significant correlations between SS and violent misconduct (r = .13; Newberry & Shuker, 2012). Overall, few predictors specific to institutional substance-related infractions have emerged (Newberry & Shuker, 2012). Conversely, various measures of IMP have resulted in the finding that higher levels of IMP predict both violent and non-violent instances of misbehaviour, including substance-related infractions, contrary to the current dissertation results (Gordon & Egan, 2008). This may be explained by the fact that a criminal lifestyle and criminal attitudes have been shown to be predictive of institutional substance infractions and suggest that incarcerated misbehaviours are due to pre-existing attributes, beliefs, and behaviours, a theory known as the Importation Hypothesis (Palermo, 2011; Walters & Crawford, 2013). Therefore, it is likely that offenders enter prison settings with a pre-existing vulnerability to engaging in institutional misconduct, such as antisociality, which is possibly compounded by elevated levels of SS.

A review of 39 studies examining the predictors of violent and non-violent institutional misconduct violations from 1940-1995 revealed a combination of situational and individual predictors (Gendreau et al., 1997). From a situational point of view, institutional (e.g., availability of programming, risk level composition of the inmates), sentence (e.g., length of time served), and crowding variables were factors that predicted misconduct at a strong, moderate and weak level, respectively. Notably, both Gendreau and colleagues (1997) and Berk and colleagues (2006) discovered that criminal history, antisocial attitudes, behaviours, and peers were the most powerful individual predictors of institutional misbehaviours. A history of substance abuse, and social determinants (i.e., education, marital status, and employment) were moderate individual predictors, whereas mental health indices (e.g., MMPI subscale scores, history of hospitalization, etc.) were the poorest individual predictors. These findings are consistent with the risk factors that have been empirically demonstrated to influence criminal recidivism identified in the RNR model. Indeed, the most powerful predictors of recidivism are referred to as the 'big four' and include the same main predictors of institutional misbehaviour (i.e., procriminal attitudes, antisocial behaviour, personality, and peers; Andrews & Bonta, 2010) found in Gendreau and colleagues (1997). Similarly, substance use and social factors (i.e., family and marital factors, lack of pro-social leisure activities, and lack of employment or education attainment) are moderate predictors, and mental health contributes minimally to recidivism (Andrews & Bonta, 2010). The similarity in predictors of institutional misbehaviour and criminal recidivism may explain the high levels of substance use infractions in the current study and trend for cluster membership to predict survival time prior to first instance of substance use in

the past three months. Specifically, the Severe cluster demonstrated the highest levels of antisocial personality disorder symptoms and psychopathy, which would capture antisocial attitudes and behaviours to a larger degree than the other clusters.

The frequency of institutional substance use in the current sample highlights the need to develop appropriate methods to monitor offender behaviour. French and Gendreau (2006) reviewed several methods that have been proposed to handle institutional misconducts. First, proponents of punitive strategies believe that removing services such as education and recreation and increasing the use of solitary confinement results in reduced misconduct. However, current empirical findings indicate that these measures do little to reign in misconduct. Proponents of offender management have noted that measures such as reduced crowding, single-cell accommodations, units designed in pod format, inmate control over lighting and telephones, lower inmate turnover and improved diet have small to moderate effects in reducing misconduct. The third and final method to reduce institutional infractions revolves around offering treatment programs. A limited number of studies have revealed that treatment programs overall engender 6% reductions in institutional misbehaviour, with clear differences in the effects of behavioural (17%) versus non-behavioural (-2%) programming (Gendreau & Keyes, 1996). Cognitive behavioural outcomes have led to an estimated 21% reduction in institutional misconduct (French & Gendreau, 2006; Morgan & Flora, 2002). French and Gendreau (2006) examined a total of 68 studies from 1952-2003 in order to determine the impact of various treatment programs aiming to reduce prison misconduct. Impressively, behavioural treatment programs resulted in 39% reductions in institutional behaviour versus 5% reductions for non-behavioural interventions.

Furthermore, interventions which targeted one or two criminogenic needs led to a reduction of 6% in misconduct, whereas reductions rose to 25% if three to eight need areas were addressed. Moreover, level of therapeutic integrity (i.e., abiding by the manualized protocol) resulted in distinct decreases in institutional misconduct, for high (47%), moderate (14%), and low integrity (8%) interventions. Therefore, the provision of behavioural interventions which target criminogenic needs at a high level of therapeutic fidelity likely result in reduced occurrences of institutional infractions. Given the support for cognitive behavioural interventions centering on the SURP personality risk factors, targeting these traits may allow for reductions in the associated criminogenic needs of antisocial behaviours and SUDs (Castellanos & Conrod, 2006; Conrod et al., 2008; Conrod et al., 2011; Conrod et al., 2006b). Furthermore, pending replication, the SURPS measure may be used to monitor offenders more closely, as those who score high in SS paired with low AS appear at highest risk for engaging in institutional substance use.

Despite some meaningful findings, several limitations preclude drawing strong conclusions about the results of the Cox regression survival analysis used in the current dissertation. First, the prison environment prevented a true prospective analysis, whereby participants would have completed the personality measures at time one and tracked their substance use on a daily basis over the subsequent three months. This is due to the fact that any record of institutional substance misuse (i.e., diary) that is discovered by security personnel could result in institutional charges. Based on the initial proposal, participants would have completed the personality measures at the first time point and reported at time 2 on their substance use in the previous three months

(i.e., since Time 1). However, this method was not feasible due to challenges with participant recruitment. For this reason, all measures were administered at the same time, which caused left censoring to occur (Bewick et al., 2004; Ibrahim et al., 2005). Left censoring refers to the scenario when the event of interest occurs before the study begins, as in this study participants either had or had not engaged in substance use in the three months prior to filling out the questionnaires (Bewick et al., 2004; Ibrahim et al., 2005). Unfortunately, left censoring prohibits determinations of causality. Furthermore, the limited sample size restricted statistical power, which may have explained the trend effect in the analyses. Therefore, firm conclusions should not be drawn prior to replication with a truly prospective dataset.

5.3 Understanding the Relationship Between SUDs & Criminal Behaviour (Goal 4)

In order to examine the underlying relationship between SUDs and criminal behaviour, a path analysis was proposed. This would have analyzed manifest variables of both SUDs and antisocial personality disorder and the latent SURP personality variables. Specifically, it was posited that all latent personality variables would have significant pathways to the SUDs latent variable, and both IMP and I/H would be related to antisocial personality disorder. The latent variables of SUDs and antisocial personality disorder were also expected to be associated. The latent variable of antisocial personality disorder was expected to have significant pathways to: criminal versatility, antisocial personality disorder symptoms, age at first conviction, and number of times incarcerated. The latent variable of SUD was expected to relate significantly to the manifest variables of substance use onset and self-reported substance severity. Finally, shared manifest variables of both SUD and antisocial personality disorder were

expected to include: total number of substance-related convictions, and both drug and alcohol dependence symptoms.

Unfortunately, as a consequence of a limited sample size, the proposed model failed to converge. Therefore, the relationship between latent and manifest variables could not be examined. Instead, a canonical correlation was used, as it allowed for an examination of the *direct* relationship between SURP variables and the manifest variables of SUDs and antisocial personality disorder as measured by the MCMI antisocial personality subscale score. Two significant models were found, each reflecting a unique pattern of relationships. The first pattern consisted of IMP, I/H and SS having a strong and positive relationship with antisociality, drug and alcohol dependence, and a moderate association with self-rated substance use severity and criminal versatility. Further, the relationship between these personality variables was moderate and negative for age at first use and first arrest. The second pattern of relationships consisted of one whereby low AS was moderately related to increased criminal versatility but decreased total drug arrests.

Several explanations have been proposed to account for the high comorbidity rates between SUDs and antisocial behaviour, including engaging in crime to fund substance use, or committing offences while under the influence (Fridell et al., 2008). However, underlying personality traits also have been explored as potential explanatory variables for the relationship between SUDs and antisocial personality disorder (Conrod & Stewart, 2005; Fridell et al., 2008). In particular, disinhibitory personality traits such as IMP and SS are claimed to be core contributors to the overlap (Krueger et al., 2007). Specifically, IMP has been shown to cluster with the externalizing behaviours of crime

and substance use (Krueger et al., 2007). Finn and colleagues (2000), and later Finn and Hall (2004) demonstrated two unique pathways to alcohol use disorders, with the first consisting of problematic impulse control leading to antisocial traits, social deviance and problematic alcohol use. The second pathway revolved around SS, whereby individuals high in SS were prone to boredom and engaged in both antisocial behaviours and substance use, obtaining positive reinforcement with a limited ability to consider consequences when faced with immediate gratification (Finn et al., 2005). These pathways are mirrored among adolescents, as poor response inhibition mediated the relationship between high IMP and conduct disorder, whereas reward response bias was a mediator between SS and problematic drinking (Castellanos-Ryan & Conrod, 2011; Castellanos-Ryan et al., 2011). Therefore, IMP likely contributed to the current findings via a disinhibition pathway, which leads to both antisocial behaviours (i.e., criminal versatility) and SUDs; whereas SS contributed to the model via a reward sensitivity pathway to SUDs and indirectly to criminal behaviour (e.g., driving under the influence convictions; Gerra & Zaimovic, 2002).

Strong correlations have been consistently found between the disinhibitory constructs of IMP, aggression, and SS with both SUDs and antisocial personality disorder (Krueger et al., 2007). Swann, Lijffijt, Lane, Steinberg, and Moeller (2009) reported high levels of IMP in those with antisocial personality disorder. Motor impulsiveness, or the tendency to act without forethought, played a central role. Furthermore, in individuals with antisocial personality disorder and SUDs, high levels of reward-delay impulsivity (i.e., the ability to delay gratification to obtain a larger reward later) were hypothesized by Swann and colleagues (2009). However, these

authors discovered that rapid-response impulsivity (i.e., the ability to evaluate a stimulus before responding) was a core feature of antisocial personality disorder, while reward-delay and attentional process were comparable to controls. Therefore, antisocial individuals have a reduced ability to evaluate a situation or stimulus prior to reacting (Swann et al., 2009). Crews and Boettiger (2009) and others (Raine et al., 2000; Yang & Raine, 2009) have argued that lesions to the orbitofrontal cortex result in self-regulation deficits (such as those seen in the Phineas Gage case study), exemplified by impulsivity, sensation seeking, personality changes, perseveration, and overall disinhibition. Individuals with a damaged orbitofrontal cortex are at increased risk for antisocial personality disorder, problem gambling, and SUDs (Crews & Boettiger, 2009; Gerra & Zaimovic, 2002). Excessive alcohol use has also been tied to neuronal loss in the orbitofrontal cortex (Crews & Boettiger, 2009; Muller et al., 2008). Therefore, it is possible that excessive substance use, as seen in the Moderate and Severe clusters herein, may damage the orbitofrontal cortex, resulting in increased disinhibition and severity of SUDs and comorbid antisocial personality disorder symptoms. Finally, adolescence has been noted as a critical risk period for both development of the prefrontal cortex and susceptibility to addictions (Crews & Boettiger, 2009). Given the initial age of substance use reported by participants of the current study (i.e., 11 years), it is possible that this mechanism serves to partially account for both the onset and maintenance of SUDs and antisociality in this sample. This possibility is supported by the finding in other research that the prevalence rates of SUDs among those who began substance use after the age of 13 years is under 2%, compared to 12-28% prevalence rates in those beginning use before 13 years of age (Sung, Erkanli, Angold, Costello,

2004). Furthermore, increased levels of IMP have been linked to an earlier age of first alcohol use (von Diemen, Bassani, Fuchs, Szobot, & Pechansky, 2008), suggesting that IMP may be a risk factor for developing a SUD.

Finally, a relationship between the antisocial deviance factor of psychopathy (e.g., irresponsibility, parasitic lifestyle, delinquency and criminal versatility) and a history of suicidal behaviours has previously been found (Gray et al., 2003; Verona, Joiner, & Patrick, 2001). Given the repeated pattern of engaging in antisocial behaviours and prolonged substance misuse, it is possible that increased levels of I/H are a response to the negative consequences associated with long-term antisocial acts and substance use (Jeglic, 2013). Furthermore, hopelessness has been linked to low problem-solving effectiveness among offenders (Bonner, 1992). This link may partially account for the parallel elevations seen with IMP and SS, as Bogg and Finn (2010) demonstrated that reduced working memory and problem-solving were impaired among those high in disinhibition. Therefore, I/H may contribute to the cognitive vulnerability present in offenders with high levels of both IMP and SS.

The second significant canonical model identified in the current study illustrated a relationship between low AS and criminal versatility (i.e., engaging in different types of criminal behaviour). The antisocial and interpersonal factors of psychopathy have been shown to be predictive of lower levels of anxiety (Neumann et al., 2013). The antisocial facet of psychopathy is associated with juvenile delinquency, criminal versatility, revocation of release, and poor behavioural controls, supporting the discovered association between low AS and criminal versatility (Hare & Neumann, 2009; Neumann et al., 2013). The interpersonal factor is partly comprised of

pathological lying and manipulativeness, which is also associated with persistent criminal recidivism (Hare & Neumann, 20009). As previously discussed, reduced recognition of internal arousal paired with antisocial attitudes is also seen in individuals with high levels of antisociality, which may contribute to engaging in criminal behaviours due to a lack of inhibition (Lilienfeld & Penna, 2001; Nebbitt et al., 2008; Sijtsema et al., 2010). Finally, Hopley and Brunelle (2012) reported a significant relationship between psychopathy and opioid dependence, mediated by low AS. Low AS was also related to opioid dependence and psychopathy (Hopley & Brunelle, 2012). Therefore, individuals low in AS may display little sensitivity to punishment and experience limited physiological arousal to internal sensations, potentially resulting in a failure to learn from negative experiences and, therefore, engage in criminal behaviour and substance use (Hopley & Brunelle, 2012).

Overall, the aforementioned findings support the common factor model of comorbidity, as both SUD severity and frequency and comorbid mental health symptoms (i.e., anxiety, depression, and antisocial personality disorder) increase as the personality risk factors of I/H, SS, and IMP become more elevated. Furthermore, Krueger, Markon, Patrick, and Iacono (2005) and others have noted that the significant comorbidity between externalizing disorders (e.g., antisocial personality disorder, SUD), supports the conceptualization of an externalizing spectrum (Wong et al., 2007). This model consisted of the latent variable of externalizing disorder related to the manifest variables of alcohol and drug use disorders, conduct disorder and antisocial behaviour (Krueger & Markon, 2006a; Wong et al., 2007). Several underlying etiological variables to the externalizing domain were discovered in the literature, which increase the

propensity towards an individual expressing an externalizing disorder, namely: genetic factors, aggressivity, novelty seeking behaviours, and IMP (Krueger et al., 2005; Krueger et al., 2007). Importantly, Krueger and colleagues (2007) noted that individuals may vary along the externalizing continuum based on the degree and number of risk factors and environmental conditions (Krueger et al., 2007).

Given the findings of the current dissertation, it may be plausible to infer that the clustering in the current sample is indicative of the presence of the above described externalizing domain, which was captured at the Mild, Moderate and Severe levels along the continuum. This finding supports the theorized conclusions (and exploratory-confirmatory structural modeling) of Krueger and colleagues (2007), in that externalizing behaviour exists on a spectrum. Furthermore, this distinction among the degree of externalization has been captured by the RNR model, as increased levels of antisociality and SUDs increase the likelihood of recidivism (Andrews & Bonta, 2010). Finally, given the limited power of the current study, it is necessary to explore in larger samples whether the precise expression of these factors is still best captured by the SURP model, whereby neurobiological vulnerabilities to varying levels of personality traits will contribute to the type of substance misused (Conrod et al., 2000a). If so, then the assessment and subsequent targeting of the common factor personality vulnerabilities may represent an important component of treatment matching, in order to improve outcome and reduce recidivism (Andrews & Bonta, 2010; Conrod et al., 2000a; Krueger et al., 2007).

5.4 Clinical and Theoretical Implications

In summary, the present dissertation attempted to validate the SURP personality typology in male offenders, determine whether this typology could predict institutional substance use, and increase the theoretical understanding of the relationship between SUDs and criminal behaviour. Overall, the provincial and federal sample of incarcerated offenders revealed a prevalence of SUDs which corresponded to previously reported levels in correctional samples but surpass community rates (Hopley & Brunelle, 2012; Kessler et al., 2005). Furthermore, the frequency of institutional substance use based on participant self-report was three and a half times larger than that detected by institutional urinalysis screenings (CSC, 2004). The high prevalence of both SUDs and institutional substance use point to the necessity of providing additional treatment services in correctional institutions. Overall, offenders were clustered based on the severity of their substance use, mental health comorbidity, and elevations in personality vulnerabilities. Furthermore, there was a trend for the Severe group to use substances while incarcerated more quickly than the Mild group, which was driven by a combination of high levels of SS and a trend for low levels of AS. Finally, two distinct patterns of relationships emerged between the SURP personality traits, criminality and SUDs, indicating that the SURP personality traits contribute to these behaviours.

The typological groupings that emerge correspond strongly to the RNR model (Andrews & Bonta, 2010). In particular, the varying levels of antisocial behaviours and attitudes, paired with the increasing levels of SUD severity and the trend for the groups to postdict distinct risk of institutional substance use, point to groups with three distinct levels of risk and criminogenic needs. Given that this model is predicated on delivering

services that are matched to risk and needs levels, the current results support the conclusion that the SURPS may be useful in identifying participants of varying risk levels and may identify inmates at increased risk for engaging in institutional substance use. Particularly telling would be a pattern characterized by elevated I/H, SS, and IMP and a low level of AS, although particular cut-offs cannot be recommended before further replication. Finally, the typology points to varying levels of comorbid mental health psychopathology and highlights the fact that as the severity level increases, offenders are more likely to present with associated conditions. This reduces the likelihood of positive treatment outcomes (Clearly et al., 2008). Moreover, high IMP has been associated with an increased likelihood of treatment drop-out prior to completion, increasing recidivism risk (Moeller et al., 2011; Olver et al., 2011). Therefore, the responsivity factors of mental health symptomatology and IMP must be considered during conceptualization and treatment planning with offenders in order to maximize outcome and reduce recidivism (Andrews & Bonta, 2010; Marlatt & Witkiewitz, 2005).

The SURP model has developed short-term interventions that are matched to individual personality vulnerability profiles (Castellanos & Conrod, 2006; Conrod et al., 2011; Conrod et al., 2006; Conrod et al., 2000b). These interventions, which have been manualized, may be modified to suit offender populations. This model has already been adapted for First Nations adolescents by including spiritual teachings (i.e., medicine wheel teachings) from the Mi'kmaq culture, resulting in increased abstinence and decreased alcohol-related problems (Mushquash, Comeau, & Stewart, 2007). Stewart (2013) has reported that these brief (i.e., 90 minute) interventions are based on several cognitive behavioural techniques. Specifically, interventions targeting I/H involve

teaching negative thought challenging and psychoeducation around the role of avoidance and using substances to cope. SS interventions center around thought challenging for boredom and need for stimulation and psychoeducation around maladaptive strategies for coping with boredom. Brief treatment for IMP follows the *stop, focus and choose* model (Kendall & Braswell, 1985), which stresses problem-solving, modelling, behavioural contingencies and psychoeducation to examine both the positive and negative short and long term consequences of behaviours. High AS treatment involves decatastrophizing and interoceptive exposure (Stewart, 2013; Watt, Stewart, Lefaivre, & Uman, 2006). Each personality intervention consists of both a psychoeducational and cognitive-behavioural component allowing individuals to better identify and challenge personality-related cognitive distortions, hot thoughts and employ alternative, adaptive behaviours (Stewart, 2013).

Within an offender population, several modifications to the aforementioned treatment methodology may increase efficacy. Specifically, Ryba (2008) has argued that in the treatment of forensic patients, level of intellectual functioning (i.e., responsivity issues) must be considered when setting the pace of treatment. Furthermore, it may be necessary to re-teach skills repeatedly. In addition, it is recommended that interventions be offered in a group format in order to reinforce the psychoeducational component and create peer-driven support. Furthermore, it is suggested that support staff (e.g., nurses, correctional officers) facilitate the use of new skills and offer prompting to rely on behavioural skills. Importantly, it is crucial to attempt to generalize the information presented within the institution to daily life after incarceration. Booster sessions may be offered throughout the period of incarceration, if required, and prior to release into the

community. Moreover, the relationship between SS, IMP and offending should be discussed, and the consequences of disinhibited behaviours and reward sensitivity (i.e., incarceration) could be stressed.

Pertaining to IMP, psychoeducation around aggression should be discussed, and similar to the stop, focus, and choose model, participants should be taught to stop and identify physical sensations, consider alternatives, act, reflect, and reward appropriate behaviours. Psychoeducation around anger precipitating events and the role of interpretation and cognitive distortions would be an essential treatment component. Finally, the finding of consistently low AS in the current sample necessitates the development of a therapeutic intervention addressing this unique characteristic. Given that individuals with low AS have been shown to have little internal recognition of physiological arousal (Lilienfeld & Penna, 2001), psychoeducation around the link between physical sensations, emotions, thoughts, and behaviours should be offered. Mindfulness-based awareness may allow for individuals low in AS to increase their recognition of physiological arousal and use that as a cue to focus and challenge cognitive distortions in that moment (Harris, 2009). In sum, the SURP personality subtypes are linked to risk level, criminogenic needs, and responsivity issues and, therefore, are likely to affect recidivism. The SURPS may serve to guide brief personality interventions at varying intensities as an adjunct to current correctional programming, in order to reduce the underlying risk factors for both antisociality and substance use.

Furthermore, this brief measure may be used to identify offenders at risk for engaging in institutional substance misuse and guide the delivery of urinalysis testing

(i.e., stratified random sampling based on typological classification of Mild, Moderate, or Severe), and provision of interventions to those at highest risk. Following replication with true prospective analysis, a presentation characterized by high SS and low AS would indicate an increased probability of engaging in institutional substance use. French and Gendreau (2006) also reported that behavioural and cognitive-behavioural interventions, which focus on criminogenic needs, reduce institutional infractions. Therefore, the brief cognitive-behavioural interventions developed based on the SURP model may reduce the likelihood of institutional substance use if incorporated into treatment via indirect reductions in associated antisocial behaviours and SUDs (Conrod et al., 2006; Conrod et al., 2011). Finally, given the limited resources in provincial settings, offering brief personality matched interventions may serve to curb future substance use and recidivism and limit the revolving door effect (Weekes et al., 1994).

From a theoretical point of view, the cluster analysis and canonical correlation results of the current dissertation support the presence of an externalizing spectrum within this correctional sample. Aggressivity, novelty seeking and IMP have been consistently linked to the expression of externalizing disorders (Krueger et al., 2007). Specifically, the varying levels of I/H, SS, and IMP point to group differences in disinhibition and associated severity of externalizing disorders. In the preparation of DSM-5, several researchers recommended a dimensional conceptualization of personality disorders, including antagonism and disinhibition (Sellbom, Smid, de Saeger, Smit, & Kamphuis, 2013). Dimensional models have indeed been shown to map well conceptually onto DSM-5 personality disorder categories (Harkness, Finn, McNulty, & Shields, 2012; Harkness & McNulty, 1994). Interestingly, the newly

released DSM-5 has shifted from categorical diagnostic categories of substance abuse and dependence to both alcohol and drug use disorders that are characterized by varying levels of severity, which is supported by the current findings (APA, 2013). Furthermore, the results of the current findings suggest that both criminal behaviour and substance misuse may be better conceptualized on a dimensional spectrum rather than as categorical and mutually exclusive conditions.

5.5 Study Limitations

There are several limitations present in the current study. First, the inclusion of an all male sample limits the generalizability of these findings to females, which is an understudied population within offender contexts. Second, SUDs were ascertained via a self-report questionnaire rather than using a diagnostic interview. However, there is typically a high level of agreement between self-report questionnaires and structured clinical interviews with offenders (Peters et al., 2000). Third, a power analysis revealed an inadequate sample size to complete the structural equation modelling analysis. The low power also may have reduced the likelihood of discovering significant effects in other analyses, possibly accounting for some non-significant trends in the current findings (MacCallum, Browne, & Sugawara, 1996). Comrey and Lee (1992) provide recommendations for ideal sample size, noting that a sample of 300 is good, 500 is superb and 1000 is the gold standard. Despite this being a multi-site study, the target sample size was not achieved, indicating a need to sample from an increased number of institutions. However, the significant findings in the canonical correlations provided meaningful information pertaining to the direct relationships between personality vulnerabilities and both criminal and substance use behaviours. Fourth, the survival

analysis was not prospective in nature, and the left censoring of the data prevented any causal inferences (Bewick et al., 2004; Ibrahim et al., 2005). The absence of both temporal proximity and a constant conjunction, paired with a main effect finding at the statistical level of trend indicates that it would be premature to conclude that level of severity (i.e., clusters) is predictive of institutional substance use. In addition, completing the third step of the Cox regression examining individual predictors on a trending main effect limits the inference that can be drawn from the results. In light of this limitation, the conclusion that high SS and low AS partially explained time until engaging in institutional substance use must be interpreted with caution. Replication of the survival analysis results with a prospective methodology would reduce the degree of caution required in interpretation, establish both temporal proximity and a constant conjunction, which together would allow for the drawing of causal inferences (Bachman & Schutt). Despite these shortcomings, the current study provided novel information on the importance of personality traits in the relationship between SUDs and criminal behaviour and filled a gap in the literature on the factors influencing institutional substance use. A final limitation consists of the fact that the current study targeted individuals who self-identified with substance use problems. Therefore, the percentage of inmates with substance use problems was likely inflated, which may have resulted in an overrepresentation of institutional substance use and prevalence rates of SUDs.

Despite these above noted limitations, the current dissertation offers a novel perspective on the role of the SURP typology in substance misuse and criminal behaviour. Future studies should attempt to replicate these findings in a larger, mixed gender sample. If further empirical investigations support the conclusions provided

herein, a subsequent step should involve evaluating the long-term effectiveness of personality-based interventions on substance use and recidivism outcomes.

References

Adams, S., Leukefels, C. G., & Peden, A. R. (2008). Substance abuse treatment for women offenders: A research review. *Journal of Addictions Nursing, 19*, 61-75. doi:10.1080/10884600800111648

Agrawal, A., Lynskey, M. T., Madden, P. A. F., Bucholz, K. K., & Health, A. C. (2006). A latent class analysis of illicit drug abuse/dependence: Results from the National Epidemiological Survey on Alcohol and Related Conditions. *Addiction, 102*, 94-104. doi:10.1111/j.1360-0443.2006.01630.x

Allen, J. P., Anton, R. F., Babor, T. F., Carbonari, J., Carroll, K. M., Connors, G. J., ... Zweben, A. (1998a). Matching alcoholism treatments to client heterogeneity: Project MATCH three-year drinking outcomes. *Alcoholism: Clinical and Experimental Research, 22*(6), 1130-1145. doi:10.1097/00000374-199803000-00016

Allen, J. P., Anton, R. F., Babor, T. F., Carbonari, J., Carroll, K. M., Connors, G. J., ... Zweben, A. (1998b). Matching patients with alcohol disorders to treatments: Clinical implications from project MATCH. *Journal of Mental Health, 7*(6), 589-602. doi:10.1080/09638239817743

Allen, J. P., Mattson, M. E., Miller, W. R., Hester, R. K., Connords, G. J., Rychtarik, R. G., ... Kivlahan, D. R. (1993). Project MATCH: Rationale and methods for a multisite clinical trial matching patients to alcoholism treatment. *Alcoholism: Clinical and Experimental Research, 17*(6), 1300-1311. doi:10.1111/j.1530-0277.1993.tb05219.x

Allison, P. D. (2010). *Survival analysis using SAS: A practical guide* (2nd ed.). Cary, NC: SAS Institute Inc.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev. ed.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Amodia, D. S., Cano, C., & Eliason, M. J. (2005). An integral approach to substance abuse. *Journal of Psychoactive Drugs, 37*(4), 363-371. doi:10.1080/02791072.2005.10399809

Andréasson, S., Allebeck, P., & Rydberg, U. (1989). Schizophrenia in users and nonusers of cannabis: A longitudinal study in Stockholm County. *Acta Psychiatrica Scandinavica, 79*(5), 505-510.

Andrews, D. A., & Bonta, J. (2006a). *The psychology of criminal conduct* (4th ed.). Newark, NJ: Lexis Nexis.

Andrews, D. A., & Bonta, J. (2006b). Rehabilitating criminal justice policy and practice. *Psychology, Public Policy, & Law, 16*(1), 39-55. doi:10.1037/a0018362

Andrews, D. A., & Bonta, J. (2010). *The psychology of criminal conduct* (5th ed.). Newark, NJ: Lexis Nexis.

Andrews, D.A., Bonta, J., & Hoge, R. D. (1990). Classification for effective rehabilitation: Rediscovering psychology. *Criminal Justice and Behaviour, 17*, 19-52. doi:10.1177/0093854890017001004

Babor, T. F. (2011). Alcohol-related collateral damage and the broader issue of alcohol's costs. *Addiction, 106*(9), 1612-1613. doi:10.1111/j.1360-0443.2011.03578.x

Babor, T. (Ed.), & Del Boca, F. (Ed.). (2003). *Treatment matching in alcoholism*. New York, NY US: Cambridge University Press.

Babor, T. F., Dolinsky, Z. S., Meyer, R. E., Hesselbrock, M., Hofmann, M., & Tennen, H. (1992a). Types of alcoholics: Concurrent and predictive validity of some common classification schemes. *British Journal of Addiction, 87*(10), 1415-1431.

Babor, T. F., Hofmann, M., DelBoca, F. K., Hesselbrock, V., Meyer, R. E., Dolinsky, Z. S., & Rounsaville, B. (1992b). Types of alcoholics, I. Evidence for an empirically derived typology based on indicators of vulnerability and severity. *Archives of General Psychiatry, 49*, 599-608.

Bacher, J., Wenzig, K., & Volger, M. (2004). *SPSS twostep cluster: A first evaluation*. Paper presented at the RC33 Sixth International Conference on Social Science Methodology, Amsterdam, Netherlands.

Bachman, R., & Schutt, R. K. (2011). *The practice of research in criminology and criminal justice* (4th ed.). Thousand Oaks, CA: SAGE Publications Inc.

Back, S. E., & Brady, K. T. (2008). Anxiety disorders with comorbid substance use disorders: Diagnostic and treatment considerations. *Psychiatric Annals, 38*(11), 724-729. doi:10.3928/00485713-0081101-01

Baillie, A. J., Stapinski, L., Crome, E., Morley, K., Sannibale, C., Haber, P., & Teesson, M. (2010). Some new directions for research on psychological interventions for comorbid anxiety and substance use disorders. *Drug and Alcohol Review, 29*, 518-524. doi:10.1111/j.1465-3362.2010.00206.x

Bales, W. D., & Piquero, A. R. (2012). Assessing the impact of imprisonment on recidivism. *Journal of Experimental Criminology, 8,* 71-101. doi:10.1007/s11292-011-9139-3

Ball, S. A. (2001). Big Five, alternative five, and seven personality dimensions: Validity in substance-dependence patients. In P. R. Costa, T. A. Widiger (Eds.), *Personality disorders and the five-factor model of personality (2nd. ed.)* (pp. 177-201). Washington, DC.: American Psychological Association. doi:10.1037/10423-011

Basu, D., Ball., S.A., Feinn, R., Gelernter, J., & Kranzler, H.R. (2004). Typologies of drug dependence: Comparative validity of a multivariate and four univariate models. *Drug and Alcohol Dependence, 73*(3), 289-300. doi:10.1016/j.drugalcdep.2003.11.004

Beckley, J. T., & Woodward, J. J. (2011). The abused inhalant toluene differentially modulates excitatory and inhibitory synaptic transmission in deep-layer neurons of the medial prefrontal cortex. *Neuropsychopharmacology, 36*, 1531-1542. doi:10.1038/npp.2011.38

Bennett, M. E., Bellack, A. S., & Gearon, J. S. (2006). Development of a comprehensive measure to assess clinical issues in dual diagnosis patients: The substance use event survey for severe mental illness. *Journal of Addictive Behaviours, 31*, 2249-2267. doi:10.1016/j.addbeh.2006.03.012

Berglund, M., Thelander, S., Salaspuro, M., Franck, J., Andreasson, S., & Ojehagen, A. (2003). Treatment of alcohol abuse: An evidence-based review. *Alcoholism: Clinical and Experimental Research, 27*, 1645-1656. doi:10.1097/01.ALC.0000090144.99832.19

Berk, R. A., Kriegler, B., Baek, J.-H. (2006). Forecasting dangerous inmate misconduct: An application of ensemble statistical procedures. *Journal of Quantitative Criminology, 22*, 131-145. doi:10.1007/s10940-006-9005-z

Bewick, V., Cheek, L., & Ball, J. (2004). Statistics review 12: Survival analysis. *Critical Care, 8*, 389-394. doi:10.1186/cc2955

Blackwell, E., Conrod, P. J., & Hansen, N. (2002). Negative cognitions, hopelessness and depression-related drinking motives [Summary]. *Alcoholism: Clinical and Experimental Research, 26*, 27A.

Bogg, T., & Finn, P. R. (2010). A self-regulatory model of behavioural disinhibition in late adolescence: Integrating personality traits, externalizing psychopathology, and cognitive capacity. *Journal of Personality & Individual Differences, 78*, 441-470. doi:10.1111/j.1467-6494.2010.00622.x

Bonner, R. L. (1992). Cognitive vulnerability and hopelessness among correctional inmates: A state of mind model. *Journal of Offender Rehabilitation, 17*, 113-122. doi:10.1300/J076v17n03_08

Bonta, J., & Cormier, R. B. (1999). Corrections research in Canada: Impressive progress and promising prospects. *Canadian Journal of Criminology, 41*(2), 235-247.

Bonta, J., Law, M., & Hanson, K. (1998). The prediction of criminal and violent recidivism among mentally disordered offenders: A meta-analysis. *Psychological Bulletin, 123*(2), 123-142. doi:10.1037/0033-2909.123.2.123

Bottlender, M., & Soyka, M. (2005). Efficacy of an intensive outpatient rehabilitation program in alcoholism: Predictors of outcomes 6 months after treatment. *European Addiction Research, 11*, 132-137. doi:10.1159/000085548

Brink, J. (2005). Epidemiology of mental illness in a correctional system. *Current Opinion in Psychiatry, 18*(5), 536-541. doi:10.1097/01.yco.0000179493.15688.78

Brinkley, C. A., Schmitt, W. A., Smith, S. S., & Newman, J. P. (2001). Construct validation of a self-report psychopathy scale: Does Levenson's Self-Report Psychopathy scale measure the same constructs as Hare's Psychopathy Checklist - Revised? *Personality and Individual Differences, 31*(7), 1021-1038. doi:10.1016/S0191-8869(00)00178-1

Brochu, S., Cousineau, M. M., Gillet, M., Cournoyer, L.-G., Pernanen, K., & Motiuk, L. (2001). Drugs, alcohol, and criminal behaviour: A profile of inmates in Canadian federal institutions. *Forum on Corrections Research, 13*(3), 20-24.

Brook, J. S., Saar, N. E., Zhang, C., & Brook, D. W. (2009). Psychosocial antecedents and adverse health consequences related to substance use. *American Journal of Public Health, 99*(3), 563-568. doi:10.2105/AJPH.2007.127225

Brown, S. A., Vik, P. W., McQuaid, J. R., Patterson, T. L., Irwin, M. R., & Grant, I. (1990). Severity of psychosocial stress and outcome of alcoholism treatment. *Journal of Abnormal Psychology, 99*(4), 344-348. doi:10.1037/0021-843X.99.4.344

Brunelle, C., Douglas, R. L., Pihl, R. O., & Stewart, S. H. (2009). Personality and substance use disorders in female offenders: A matched controlled study. *Personality and Individual Differences, 46*, 472-476. doi:10.1016/j.paid.2008.11.017

Burns, R. B., & Burns, R. A. (2008). *Business research methods and statistics using SPSS* (pp. 552-567). London: Sage.

Byrne, J.M., & Roberts, A.R. (2007). New directions in offender typology design, development, and implementation: Can we balance risk, treatment and control? *Aggression and Violent Behaviour, 12(5),* 483-492. doi:10.1016/j.avb.2007.02.009

Campbell, I. (2007). Chi-squared and Fisher-Irwin tests of two-by-two tables with small sample recommendations. *Statistics in Medicine*, *26*, 3661-3675. doi:10.1002/sim.2832

Campbell, M.A., Doucette, N.L., & French, S. (2009). Validity and stability of the Youth Psychopathic Traits Inventory in a nonforensic sample of young adults. *Journal of Personality Assessment, 91*(6), 584-592. doi:10.1080/00223890903228679

Canadian Centre on Substance Abuse. (2004). *Canadian addiction survey: Prevalence of use and related harms*. Ottawa, ON: Canadian Centre on Substance Abuse.

Canadian Centre on Substance Abuse. (2005). *Substance abuse in Canada: Current challenges and choices*. Ottawa, ON: Canadian Centre on Substance Abuse.

Carlotta, D., Borroni, S., Maffei, C., & Fossati, A. (2011). The role of impulsivity, sensation seeking and aggression in the relationship between childhood AD/HD symptom and antisocial behaviour in adolescence. *Neurology, Psychiatry and Brain Research, 17,* 89-98. doi:10.1016/j.npbr.2011.08.002

Carroll, K. M., & Onken, L. S. (2005). Behavioural therapies for drug abuse. *American Journal of Psychiatry, 162*(8), 1452-1460. doi:10.1179/appi.ajp.162.8.1452

Caspi, A., Moffitt, T. E., Newman, D. L., & Silva, P. A. (1996). Behavioural observations at age 3 years predict adult psychiatric disorders. *Archives of General Psychiatry, 53*(11), 1033-1039.

Castellanos, N., & Conrod, P. (2006). Brief interventions targeting personality risk factors for adolescent substance misuse reduce depression, panic and risk-taking behaviours. *Journal of Mental Health, 15*(6), 645-658. doi:10.1080/09638230600998912

Castellanos-Ryan, N., & Conrod, P. J. (2011). Personality correlates of the common and unique variance across conduct disorder and substance misuse symptoms in adolescence. *Journal of Abnormal Child Psychology, 39,* 563-576. doi:10.1007/s10802-010-9481-3

Castellanos-Ryan, N., Rubia, K., & Conrod, P. J. (2011). Response inhibition and reward response bias mediate the predictive relationships between impulsivity and sensation seeking and common and unique variance in conduct disorder and substance misuse. *Alcoholism: Clinical and Experimental Research, 35*(1), 140-155. doi:10.1111/j.1530-0277.2010.01331.x

Cecero, J. J., Ball, S. A., Tennen, H., Kranzler, H. R., & Rounsaville, B. J. (1999). Concurrent and predictive validity of antisocial personality disorder subtyping among substance abusers. *The Journal of Nervous and Mental Disease, 187*(8), 478-486. doi:10.1097/00005053-199908000-00004

Chambers, R. A., Krystal, J. H., & Self, D. W. (2001). A neurobiological basis for substance abuse comorbidity in schizophrenia. *Society of Biological Psychiatry, 50*(2), 71-83. doi:10.1016/S0006-3223(01)01134-9

Chen, X., de Haas, S., de Kam, M., & van Gerven, J. (2012). An overview of the CNS-pharmacodynamic profiles of nonselective and selective GABA agonists. *Advances*

in Pharmacological Sciences, Electronic publication, 1-10. doi:10.1155/2012/134523

Cisler, R. A., Kowalchuk, R. K., Saunders, S. M., Zweben, A., & Trinh, H. Q. (2005). Applying clinical significance methodology to alcoholism treatment trails: Determining recovery outcome status with individual- and population-based measures. *Alcoholism: Clinical and Experimental Research, 29*(11), 1991-2000. doi:10.1097/01.alc.0000187159.75424.77

Clark, D. B., Kirisci, L., & Tarter, R. E. (1998). Adolescent versus adult onset and the development of substance use disorders in males. *Drug and Alcohol Dependence, 49*(2), 115-121. doi:10.1016/S0376-8716(97)00154-3

Cleary, M., Hunt, G. E., Matheson, S., & Walter, G. (2008). Psychosocial treatments for people with co-occurring severe mental illness and substance misuse: Systematic review. *Journal of Advanced Nursing, 65*(2), 238-258. doi:10.1111/j.1365-2648.2008.04879.x

Cloninger, C. R. (1987a). Neurogenic adaptive mechanisms in alcoholism. *Science, 236*(4800), 410-416.

Cloninger, C. R. (1987b). The Tridimensional Personality Questionnaire. Saint Louis, MO: Washington University School of Medicine.

Cloninger, C. R. (1995). The psychobiological regulation of social cooperation. *Nature Medicine, 1,* 623-625. doi:10.1038/nm0795-623

Compton, W. M., Cottler, L. B., Phelps, D. L., Abdallah, A. B., & Spitznagel, E. L. (2000). Psychiatric disorders among drug dependent subjects: Are they primary or

secondary. *The American Journal on Addictions, 9*(2), 126-134. doi:10.1080/10550490050173190

Compton, W. M., Thomas, Y. F., Conway, K. P., & Colliver, J. D. (2005). Developments in the epidemiology of drug use and drug use disorders. *The American Journal of Psychiatry, 162*(8), 1494-1502. doi:10.1176/appi.ajp.162.8.1494

Compton, W. M., Thomas, Y. F., Stinson, F. S., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States. *Archives of General Psychiatry, 64*(5), 566-576. doi:10.1001/archpsyc.64.5.566

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis*. Hillsdale, NY: Erlbaum.

Conrod, P. J. (2006). The role of anxiety sensitivity in subjective and physiological responses to social and physical stressors. *Cognitive Behaviour Therapy, 35*(4), 216-225. doi:10.1080/16506070600898587

Conrod, P. J., Castellanos, N., & Mackie, C. (2008). Personality-targeted interventions delay the growth of adolescent drinking and binge drinking. *Journal of Child Psychology and Psychiatry, 49*(2), 181-190. doi:10.1111/j.1469-7610.2007.01826.x

Conrod, P.J., Castellanos-Ryan, N., & Mackie, C. (2011). Long-term effects of a personality-targeted intervention to reduce alcohol use in adolescents. *Journal of Consulting and Clinical Psychology, 79*(3), 296-306. doi:10.1037/a0022997

Conrod, P. J., Castellanos-Ryan, N., & Strang, J. (2010). Brief, personality-targeted coping skills interventions and survival as a non-drug user over a 2-year period

during adolescence. *Archives of General Psychiatry, 67*(1), 85-93. doi:10.1001/achgenpsychiatry.2009.173

Conrod, P. J., Petersen, J. B., & Pihl, R. O. (1997). Disinhibited personality and sensitivity to alcohol reinforcement: Independent correlates of drinking behaviour in sons of alcoholics. *Alcoholism: Clinical and Experimental Research, 21*(7), 1320-1332. doi:10.1097/00000374-199710000-00024

Conrod, P. J., Pihl, R. O., Stewart, S. H., & Dongier, M. (2000a). Validation of a system of classifying female substance abusers on the basis of personality and motivational risk factors of substance abuse. *Psychology of Addictive Behaviours, 14*(3), 243-256. doi:10.1037//0893-164X.14.3.243

Conrod, P. J., & Stewart, S. H. (2005). A critical look at dual-focused cognitive-behavioural treatments for comorbid substance use and psychiatric disorders: Strengths, limitations, and future directions. *Journal of Cognitive Psychotherapy: An International Quarterly, 19*(3), 261-284. doi:10.1891/jcop.2005.19.3.261

Conrod, P. J., Stewart, S. H., Comeau, N., & Maclean, A. M. (2006). Efficacy of cognitive-behavioural intervention targeting personality risk factors for youth alcohol misuse. *Journal of Clinical Child and Adolescent Psychology, 35*(4), 550-563. doi:10.1207/s15374424jccp3504_6

Conrod, P. J., Stewart, S. H., Pihl, R. O., Coté, S., Fontaine, V., & Dongier, M. (2000b). Efficacy of brief coping skills interventions that match different personality profiles of female substance abusers. *Psychology of Addictive Behaviours, 14*(3), 231-242. doi:10.1037//0893-164X.14.3.231

Conrod, P. J., & Woicik, P. (2002). Validation of a four-factor model of personality risk for substance abuse and examination of a brief instrument for assessing personality risk. *Addiction Biology, 7*(3), 329-346. doi:10.1080/13556210220139569

Copello, A., Godfrey, C., Heather, N., Hodgson, R., Orford, J., Raistrick, D. ... Williams, P. (2007). UK alcohol treatment trial: Client-treatment matching effects. *Addiction, 103*(2), 228-238. doi:10.1111/j.1360-0443.2007.02060.x

Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*(2), 117-128. doi:10.1037/1040-3590.6.2.117

Copas, A. J., & Farewell, V. T. (2001). Incorporating retrospective data into an analysis of time to illness. *Biostatistics, 2*(1), 1-12.

Correctional Service of Canada (2004). *Urinalysis statistics and drug seizures*. Ottawa, ON, Canada: Security Division of Correctional Service of Canada

Correctional Service of Canada (2006). *Profile of women offenders*. Ottawa, ON, Canada: Correctional Service of Canada.

Craig, L. A. (2009). The effect of age on sexual and violent reconviction. *International Journal of Offender Therapy and Comparative Criminology*, *55*(1), 75-97. doi:10.1177/0306624X09353290

Craig, R. J., Bivens, A., & Olson, R. (1997). MCMI-III-derived typological analysis of cocaine and heroin addicts. *Journal of Personality Assessment, 69*(3), 583-595. doi:10.1207/s15327752jpa6903_11

Crews, F. T., & Boettiger, C. A. (2009). Impulsivity, frontal lobes and risk for addiction. *Pharmacology, Biochemistry and Behaviour, 93*, 237-247. doi:10.1016/j.pbb.2009.04.018

Cunningham, M. D., Sorensen, J. R., Vigen, M. P., & Woods, S. O. (2011). Correlates and actuarial models of assaultive prison misconduct among violence-predicted capital offenders. *Criminal Justice and Behaviour, 38*, 5-25. doi:10.1177/0093854810384830

Curran, H. V., Kleckham, J., Bearn, J., Strang, J., & Wanigaratne, S. (2001). Effects of methadone on cognition, mood and craving in detoxifying opiate addicts: A dose-response study. *Psychopharmacology, 154*, 153-160. doi:10.1007/s002130000628

Currie, S. R., Patten, S. B., Williams, J. A., Wang, J., Beck, C. A., el-Guebaly, N., & Maxwell, C. (2005). Comorbidity of major depression with substance use disorders. *The Canadian Journal of Psychiatry, 50*(10), 660-666.

Curry, J., Silva, S., Rhode, P., Ginsburg, G.,Kennard, B., Kratochvil, Simons, A., Kirchner, J., ... March, J. (2012). Onset of alcohol or substance use disorders following treatment for adolescent depression. *Journal of Consulting and Clinical Psychology, 80*, 299-312. doi:10.1037/a0026929

Davis, L. J., Hoffmann, N. G., Morse, R. M., & Luehr, J. G. (1992). Substance use disorder diagnostic schedule (SUDDS): The equivalence and validity of a computer-administered and interviewer administered format. *Alcoholism: Clinical and Experimental Research, 16*(2), 250-254. doi: 10.1111/j.1530-0277.1992.tb01371.x.

De, B., Mattoo, S. K., & Basu, D. (2003). Age at onset typology in opioid-dependent men: An exploratory study from India. *The American Journal on Addictions, 12*, 336-345. doi:10.1080/10550490390226923

de Graff, R., Bijl, R. V., Spijker, J., Beekman, A. T. F., & Vollebergh, W. A. M. (2003). Temporal sequencing of lifetime mood disorders in relation to comorbid anxiety and substance use disorders: Findings from the Netherlands Mental Health Survey and Incidence Study. *Social Psychiatry and Psychiatric Epidemiology, 38*, 1-11. doi:10.1007/s00127-003-0597-4

DeJong, J., Virkkunen, M., & Linnoila, M. (1992). Factors associated with revidivism in a criminal population. *Journal of Nervous and Mental Disease, 180*, 543-550. doi:10.1097/00005053-199209000-00001

DeMarce, J. M., Burden, J. L., Lash, S. J., Stephens, R. S., & Grambow, S. C. (2007). Convergent validity of the timeline followback for persons with comorbid psychiatric disorders engaged in residential substance use treatment. *Journal of Addictive Behaviours, 32*, 1582-1592. doi:10.1016/j.addbeh.2006.11.015

Dempster, A. P., Laird, N. M., & Rubin, D.B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the Royal Statistical Society, Series B, 39*(1), 1-38.

Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioural and Brain Sciences, 22*(3), 491-569. doi:10.1017/S0140525X99002046

Dolan, P., & Peasgood, T. (2007). Estimating the economic and social costs of the fear of crime. *British Journal of Criminality, 47*, 121-132. doi:10.1093/bjc/az1015

Dowden, C., & Andrews, D. A. (2000). Effective correctional treatment and violent reoffending: A meta-analysis. *Canadian Journal of Criminology, 42(*4), 449-467.

Dowden, C., Antonowicz, D., & Andrews, D. A. (2003). The effectiveness of relapse prevention with offenders: A meta-analysis. *International Journal of Offender Therapy and Comparative Criminology, 47*(5), 516-528. doi:10.1177/0306624X03253018

Drake, R. E., Goldman, H. H., Leff, S., Lehman, A. F., Dixon, L., Mueser, K. T., & Torrey, W. C. (2001). Implementing evidence-based practices in routine mental health service settings. *Psychiatric Services, 52,* 179-182. doi:10.1176/appi.ps.52.2.179

Drake, R. E., Mercer-McFadden, C., Mueser, K. T., McHugo, G. J., & Bond, G. R. (1998). Review of integrated mental health and substance abuse treatment for patients with dual disorders. *Schizophrenia Bulletin, 24,* 589-608.

Dulit, R. A., Fyer, M. R., Haas, G. L., Sullivan, T., & Frances, A. J. (1990). Substance use in borderline personality disorder. *American Journal of Psychiatry, 147*(8), 1002-1007.

Dutra, L., Stathopoulou, G., Basden, S. L., Leyro, T. M., Power, M. B., & Otto, M. W. (2008). A meta-analytic review of psychosocial interventions for substance use disorders. *The American Journal of Psychiatry, 165*(2), 179-187. doi:10.1176/appi.ajp.2007.061110851

Dyce, J. A., O'Connor, B. P., Parkins, S. Y., & Janzen, H. L. (1997). Correlational structure of the MCMI-III personality disorder scales and comparisons with other

data sets. *Journal of Personality Assessment, 69*(3), 568-582. doi:10.1207/s15327752jpa6903_10

Earleywine, M., Finn, P. R., Peterson, J. B., & Pihl, R. O. (1992). Factor structure and correlates of the Tridimensional Personality Questionnaire. *Journal of Studies on Alcohol, 53*(3), 233-238.

Edens, J.F., Poythress, N. G., Lilienfeld, S.O., & Patrick, C.J. (2008). A prospective comparison of two measures of psychopathy in the prediction of institutional misconduct. *Behavioural Sciences and the Law, 26,* 529-541. doi:10.1002/bsl.823

Ersche, K. D., & Sahakian, B. J. (2007). The neuropsychology of amphetamine and opiate dependence: Implications for treatment. *Neuropsychology Review, 17,* 317-336. doi:10.1007/s11065-007-9033-y

Fals-Stewart, W., O'Farrell, T. J., Freitas, T. T., McFarlin, S. K., & Rutigliano, P. (2000). The timeline followback reports of psychoactive substance use by drug-abusing patients: Psychometric properties. *Journal of Consulting and Clinical Psychology, 68*(1), 134-144. doi:10.1037//0022-006X.68.1.134

Fazel, S., Bains, P., & Doll, H. (2006). Substance abuse and dependence in prisoners: A systematic review. *Addiction, 101,* 181-191. doi:10.1111/j.1360-0443.2006.01316.x

Fei, L., & Tsien, J. Z. (2009). Memory and the NMDA Receptor. *The New England Journal of Medicine, 361*(3), 302-303. doi:10.1056/NEJMcibr0902052

Feingold, A., Ball, S. A., Kranzler, H. R., & Rounsaville, B. J. (1996). Generalizability of the Type A/Type B distinction across different psychoactive substances. *The American Journal of Drug and Alcohol Abuse, 22*(3), 449-462. doi:10.1039/00952999609001671

Fillmore, M. T., & Jude, R. (2011). Defining "binge" drinking as five drinks per occasion or drinking to a .08% BAC: Which is more sensitive to risk? *The American Journal on Addictions, 20*, 468-475. doi:10.1111/j.1521-0391.2011.00156.x

Finn, P. R., Bobova, L., Wehner, E., Fargo, S., & Rickert, M. E. (2005). Alcohol expectancies, conduct disorder, and early-onset alcoholism: Negative expectancies are associated with less drinking in non-impulsive versus impulsive subjects. *Addiction, 100*, 953-962. doi:10.1111/j.1360-0443.2005.01105.x

Finn, P. R., & Hall, J. (2004). Cognitive ability and risk for alcoholism: Short-term memory capacity and intelligence moderate personality risk for alcohol problems. *Journal of Abnormal Psychology, 113*(4), 569-581. doi:10.1037/0021-843X.113.4.569

Finn, P. R., Mazas, C. A., Justus, A. N., & Steinmetz, J. (2002). Early-onset alcoholism with conduct disorder: Go/no go learning deficits, working memory capacity, and personality. *Alcoholism: Clinical and Experimental Research, 26*(2), 186-206. doi:10.1097/00000374-200202000-00006

Finn, P. R., Sharkansky, E. J., Brandt, K. M., & Turcotte, N. (2000). The effects of familial risk, personality, and expectancies on alcohol use and abuse. *Journal of Abnormal Psychology, 109*(1), 122-133. doi:10.1037//0021-843X.109.1.122

Flanagan, T. J. (1983). Correlates of institutional misconduct among state prisoners: A research note. *Criminology, 21*, 29-39. doi:10.1111/j.1745-9125.1983.tb00249.x

French, S. A., & Gendreau, P. (2006). Reducing prison misconducts: What works! *Criminal Justice and Behaviour, 33*, 185-218. doi:10.1177/0093854805284406

French, M. T., Roebuck, M. C., McGeary, K. A., Chitwood, D. D., & McCoy, C. B. (2001). Using the Drug Abuse Screening Test (DAST-10) to analyze health services utilization and cost for substance users in a community-based setting. *Substance Use & Misuse, 36*(6-7), 927-946. doi:10.1081/JA-100104096

Fridell, M., & Hesse, M., Maeger, M. M., & Kuhlhorn, E. (2008). Antisocial personality disorder as a predictor of criminal behaviour in a longitudinal study of a cohort of abusers of several classes of drugs: Relation to type of substance and type of crime. *Journal of Addictive Behaviours, 33*, 799-811. doi:10.1016/j.addbeh.2008.01.001

Friedel, R. O. (2004). Dopamine dysfunction in borderline personality disorder: A hypothesis. *Neuropsychopharmacology, 29*, 1029-1039. doi:10.1038/sj.npp.1300424

Gendreau, P., Goggin, C. E., & Law, M. A. (1997). Predicting prison misconducts. *Criminal Justice and Behaviour, 24*, 414-431. doi:10.1177/0093854897024004002

Gendreau, P., & Keyes, D. (2001). Making prisons safer and more humane environments. *Canadian Journal of Criminology, 43*(1), 123-130.

Gerra, G., & Zaimovic, A. (2002). Exploring the biological relationship between substance use and psychiatric disorders. *Current Opinion in Psychiatry*, *15*(3), 269-275. doi:10.1097/00001504-200205000-00007

Gibbons, D.C. (1975). Offender typologies: Two decades later. *British Journal of Criminology*, *15*(2), 140-156.

Gioia, C. J., Sobell, L. C., Sobell, M. B., & Simco, E. R. (2012). Shorter and proximal timeline followback windows are representative of longer posttreatment

functioning. *Psychology of Addictive Behaviour, 26*, 880-887. doi:10.1037/a0027027

Glennon, R. A. (2008). Neurobiology of hallucinogens. In M. Galanter, & H. D. Kleber (Eds.), *The American Psychiatric Publishing textbook of substance abuse treatment (4th ed.)*(pp.181-189). Arlington, VA, USA: American Psychiatric Publishing, Inc.

Goetting, A., & Howsen, R. M. (1986). Correlates of prisoner misconduct. *Journal of Quantitative Criminology, 2*(1), 49-67.

Goodwill, A.M., Alison, L.J., & Beech, A.R. (2009). What works in offender profiling? A comparison of typological, thematic, and multivariate models. *Behavioral Sciences and the Law, 27*, 507-529. doi:10.1002/bsl.867

Gonzalez-Guarda, R. M., Florom-Smith, A. L., & Thomas, T. (2011). A syndemic model of substance abuse, intimate partner violence, HIV infection, and mental health among Hispanics. *Public Health Nursing, 28*(4), 366-378. doi:10.1111/j.1525-1446.2010.00928.x

Gordon, V., & Egan, V. (2011). What self-report impulsivity measure best postdicts criminal convictions and prison breaches of discipline? *Psychology, Crime & Law, 17*, 305-318. doi:10.1080/10683160903203946

Grabarek, J. K., Bourke, M. L., & van Hasselt, V. B. (2002). Empirically derived MCMI-III personality profiles of incarcerated female substance abusers. *Journal of Offender Rehabilitation, 35*(2), 19-29. doi:10.1300/J076v35n02_02

Grant, J. (2009). A profile of substance abuse, gender, crime, and drug policy in the United States and Canada. *Journal of Offender Rehabilitation, 48*(8), 654-668. doi:10.1080/10509670903287667

Grant, M. D., Lyons, M. J., Lehman, C. L., Bar, J., Nir, T., Eisen, S. ... Tsuang, M. (2005). Elucidating the comorbid relationship between panic disorder and alcohol dependence in Vietnam era male twins. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics, 138B*(1), 35.

Gray, J. A. (1987). Perspectives on anxiety and impulsivity: A commentary. *Journal of Research in Personality, 21*(4), 493-509.

Gray, N. S., Hill, C., McGleish, A., Timmons, D., MacCulloch, M. J., & Snowden, R. J. (2003). Prediction of violence and self-harm in mentally disordered offenders: A prospective study of the efficacy of HCR-20, PCL-R, and psychiatric symptomatology. *Journal of Consulting and Clinical Psychology, 71*(3), 443-451. doi:10.1037/0022-006X.71.3.443

Greenfield, S. F., Trucco, E. M., McHugh, R. K., Lincoln, M., & Gallop, R. J. (2007). The women's recovery group study: A stage 1 trial of women-focused group therapy for substance use disorders versus mixed-gender group drug counseling. *Drug and Alcohol Dependence, 90,* 39-47. doi:10.1016/j.drugalcdep.2007.02.009

Greenfield, B. L., Venner, K. L., Kelly, J. F., Slaymaker, V., & Bryan, A. D. (2012). The impact of depression on abstinence self-efficacy and substance use outcomes among emerging adults in residential treatment. *Psychology of Addictive Behaviors, 26,* 246-254. doi:10.1037/a0026917

Gudicha, D. W., Vermunt, J. K., & Tekle, F. (2013). Power and sample size computation for Wald tests in latent class models. *Netherlands Organisation for Scientific Research,* 1-19.

Gumpert, C. H., Winerdal, U., Grundtman, M., Berman, A. H., Kristiansson, M., & Palmstierna, T. (2010). The relationship between substance abuse treatment and crime relapse among individuals with suspected mental disorder, substance abuse, and antisocial behaviour: Findings from the MSAC study. *The International Journal of Forensic Mental Health, 9*(2), 82-92. doi:10.1080/14999013.2010.499557

Haddy, C., Strack, S., & Choca, J. P. (2005). Linking personality disorders and clinical syndromes on the MCMI-III. *Journal of Personality Assessment, 84*(2), 193-204. doi:10.1207/s15327752jpa8402_09

Hall, W., Degenhardt, L., & Teesson, M. (2009). Reprint of "Understanding comorbidity between substance use, anxiety and affective disorders: Broadening the research base." *Journal of Addictive Behaviours, 34*(10), 795-799. doi:10.1016/j.addbeh.2009.03.040

Hare, R. D., & Neumann, C. S. (2009). Psychopathy: Assessment and forensic implications. *The Canadian Journal of Psychiatry, 54*(12), 791-802.

Harkness, A. R., Finn, J. A., McNulty, J. L., & Shields, S. M. (2012). The personality psychopathology five (PSY-5): Recent constructive replication and assessment literature review: *Psychological Assessment, 24*, 432-443. doi:10.1037/a9925830

Harkness, A. R., & McNulty, J. L. (1994). The personality psychopathology five (PSY-5): Issues from the pages of a diagnostic manual instead of a dictionary. In S. Strack & M. Lorr (Eds.), *Differentiating normal and abnormal personality* (pp. 291-315). New York, NY: Springer.

Harris, R. (2009). *ACT made simple: An easy-to-read primer on acceptance and commitment therapy*. Oakland, CA : New Harbinger Publications.

Harwood, H. (2000). *Updating estimates of the economic costs of alcohol abuse in the United States: Estimates, update data, and methods* (NIH Publication No. 98-4327). Rockville, MD: Department of Health and Human Services.

Harwood, H., & Bouchery, E. (2004). *The economic costs of drug abuse in the United States 1992-2002* (The Lewin Group Publication No. 282-98-0016). Washington, DC: Executive Office of the President Office of National Drug Control Policy

Hawkins, L. W. (2007). The impact of personality and affect on college students' motives for marijuana use. *Dissertation Abstracts International, 68*(2-B), 1306-1417.

Health Canada. (2011). *Canadian alcohol and drug use monitoring survey*. Ottawa, ON: Health Canada, Controlled Substances and Tobacco Directorate.

Hearon, B. A., Calkins, A. W., Halperin, D. M., McHugh, R. K., Murray, H. W., & Otto, M. W. (2011). Anxiety sensitivity and illicit sedative use among opiate-dependent women and men. *The American Journal of Drug and Alcohol Abuse, 37,* 43-47. doi:10.3109/00952990.2010.535581

Helmus, L., Thornton, D., Hanson, R. K., & Babchishin, K. M. (2012). Improving the predictive accuracy of Static-99 and Static-2002 with older sex offenders: Revised age weights. *Sexual Abuse: A Journal of Research and Treatment, 24*(1), 64-101. doi:10,1177/1079063211409951

Hesse, M. (2009). Integrated psychological treatment for substance use and comorbid anxiety or depression vs. treatment for substance use alone: A systematic review of the published literature. *BMC Psychiatry, 9*(6), 1-8. doi:10.1186/1471-244X-9-6

Hides, L., Lubman, D. I., Cosgrave, E. M., Buckby, J. A., Killackey, E., & Yung, A. (2008). Motives for substance use among young people seeking mental health treatment. *Early Intervention in Psychiatry, 2,* 188-194. doi:10.1111/j.1751-7893.2008.00076.x

Hilarski, C., & Wodarski, J. S. (2001). Comorbid substance abuse and mental illness: Diagnosis and treatment. *Journal of Social Work Practice in the Addictions, 1*(1), 105-119. doi:10.1300/J160v01n01_08

Hodgins, D. C., el-Guabaly, N., & Armstrong, S. (1995). Prospective and retrospective reports of mood states before relapse to substance use. *Journal of Consulting and Clinical Psychology, 63*(3), 400-407. doi:10.1037/0022-006X.63.3.400

Hodgins, D. C., el-Guebaly, N., Armstrong, S., & Dufour, M. (1999). Implications of depression on outcome from alcohol dependence: A 3-year prospective follow-up. *Alcoholism: Clinical and Experimental Research, 23*(1), 151-157. doi:10.1011/j.1530-0277.199.tb04037.x

Hoffmann, N. G., & Harrison, P. A. (1995). *SUDDS-IV: Substance use disorder diagnostic schedule-IV.* St. Paul, MN: New Standards, Inc.

Hopley, A. A. B., & Brunelle, C. (2012). Personality mediators of psychopathy and substance dependence in male offenders. *Journal of Addictive Behaviours, 37*(8), 947-955. doi:10.1016/j.addbeh.2012.03.031

Horsfall, J., Cleary, M., Hunt, G. E., & Walter, G. (2009). Psychosocial treatments for people with co-occurring severe mental illnesses and substance use disorders (dual diagnosis): A review of empirical evidence. *Harvard Review of Psychiatry, 17*, 24-34. doi: 10.1080/10673220902724599

Horvath, L. S., Milich, R., Lynam, D., Leukefeld, C., & Clayton, R. (2004). Sensation seeking and substance use: A cross-lagged panel design. *Individual Differences Research, 2*(3), 175-183.

Howard, R., McCarthy, L., Huband, N., & Duggan, C. (2013). Re-offending in forensic patients released from secure care: The role of antisocial/borderline personality disorder co-morbidity, substance dependence and severe childhood conduct disorder. *Criminal Behaviour and Mental Health, 23*, 191-202. doi:10.1002/cbm.1852

Hsu, L. M. (2002). Diagnostic validity statistics and the MCMI-III. *Psychological Assessment, 14*(4), 410-422. doi:10.1037//1040-3593.14.4.410

Ibrahim, J. G., Chen, M.-H., & Sinha, D. (2005). Bayesian survival analysis. In J. G. Ibrahim, M.-H. Chen, & D. Sinha (Eds.), *Encyclopedia of Biostatistics* (pp. 1-491). Published Online: John Wiley & Sons, Ltd. doi:10.1002/0470011815.b2a11006

Imel, Z. E., Wampold, B. E., Miller, S. D., & Fleming, R. R. (2008). Distinctions without a difference: Direct comparisons of psychotherapies for alcohol use disorders. *Psychology of Addictive Behaviours, 22*(4), 533-543. doi:10.1037/a0013171

Ireland, J. L., & Higgins, P. (2013). Behavioural stimulation and sensation-seeking among prisoners: Applications to substance dependency. *International Journal of Law and Psychiatry, 36*, 229-234. doi:10.1016/j.ijlp.2013.04.006

Ismail, A. C., Seneviratne, R. A., Newcombe, P. A., & Wanigaratne, S. (2009). A model of substance abuse risk: Adapting to the Sri Lankan context. *Evaluation Review, 33*(1), 83- 97. doi:10.1177/0193841X08325145

Jarl, J., Johansson, P., Eriksson, A., Eriksson, M., Gerdtham, U.-G., Hemstrom, O., ... Room, R. (2008). The societal cost of alcohol consumption: An estimation of the economic and human cost including health effects in Sweden, 2002. *The European Journal of Health Economics, 9*, 351-360. doi:10.1007/s10198-007-0082-1

Jeglic, E. L., Mercado, C. C., & Levenson, J. S. (2012). The prevalence and correlates of depression and hopelessness among sex offenders subject to community notification and residence restriction legislation. *American Journal of Criminal Justice, 37*, 46-59. doi:10.1007/s12103-010-9096-9

Jellinek, E. M. (1960). *The disease concept of alcoholism*. New Brunswick: Hillhouse Press.

Jiang, S. (2005). Impact of drug use on inmate misconduct: A multilevel analysis. *Journal of Criminal Justice, 33*, 153-163. doi:10.1016/j.jcrimjus.2004.12.007

Johnson, M. W., MacLean, K. A., Reissig, C. J., Prisinzano, T. E., & Griffiths, R. R. (2011). Human psychopharmacology and dose-effects of salvinorin A, a kappa opioid agonist hallucinogen present in the plant *Salvia divinorum*. *Drug and Alcohol Dependence, 115*(1-2), 150-155. doi:10.1016/j.drugalcdep.2010.11.005

Jolin, A., & Gibbons, D. C. (1987). Age patterns in criminal involvement. *International Journal of Offender Therapy and Comparative Criminology, 31*(3), 237-260. doi:10.1177/0306624X8703100306

Kendall, P. C., & Braswell, L. (1985). *Cognitive-behavioural therapy for impulsive children*. New York, NY: Guilford Press.

Kendler, K. S., Aggen, S. H., Knudsen, G. P., Roysamb, E., Neale, M. C., & Reichborn-Kjennerud, T. (2011). The structure of genetic and environmental risk factors for syndromal and subsyndromal common DSM-IV Axis I and all Axis II disorders. *American Journal of Psychiatry, 168*(1), 29-39. doi:10.1176/appi.ajp.2010.10030340

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 593-602. doi:10.1001/archpsyc.62.6.593

Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S. ... Kendler, K. S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. *Archives of General Psychiatry, 51*(1), 8-19.

Kessler, R. C., Nelson, C. B., McGonagle, K. A., Edlund, M. J., Frank, R. G., & Leaf, P. J. (1996). The epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilization. American Journal of Orthopsychiatry, 66, 17-31. doi:10.1037/h0080151

Kessler, R. C., Petukhova, M., & Zaslavsky, A. M. (2011). The role of latent internalizing and externalizing predispositions in accounting for the development of comorbidity among common mental disorders. *Current Opinion in Psychiatry, 24*, 307-312. doi:10.1097/YCO.0b013e3283477b22

Kessler, R. C., Rubinow, D. R., Holmes, C., Abelson, J. M., & Zhao, S. (1997). The epidemiology of DSM-III-R bipolar I disorder in a general population survey. *Psychological Medicine, 27(*5), 1079-1089.

Khan, A. A., Jacobson, K. C., Gardner, C. O., Prescott, C. A., & Kendler, K. S. (2005). Personality and comorbidity of common psychiatric disorders. *The British Journal of Psychiatry, 186,* 190-196. doi:10.1192/bjp.186.3.190

Kielbasa, W., & Fung, H.-L. (2000). Pharmacokinetics of a model organic nitrite inhalant and its alcohol metabolite in rats. *Drug Metabolism and Disposition*, *28*(4), 386-391.

Kirshenbaum, A. P., Olsen, D. M., & Bickel, W. K. (2009). A quantitative review of the ubiquitous relapse curve. *Journal of Substance Abuse Treatment, 36*, 8-17. doi:10.1016/j.jstat.2008.04.001

Kitchen, H. A. (2005). Needing treatment: A snapshot of provincially incarcerated adult offenders in Nova Scotia with a view towards substance abuse and population health. *Canadian Journal of Criminology and Criminal Justice, 47*(3), 501-525.

Klag, S., O'Callaghan, F., & Creed, P. (2005). The use of legal coercion in the treatment of substance abusers: An overview and critical analysis of thirty years of research. *Substance Use & Misuse, 40*, 1777-1795. doi:10.1080/10826080500260891

Kownacki, R. J., & Sadish, W. R. (1999). Does Alcoholics Anonymous work? The results from a meta-analysis of controlled experiments. *Substance Use & Misuse, 34*(13), 1897-1916. doi:10.3109/10826089909039431

Kraanen, F. L., Scholing, A., & Emmelkamp, P. M. G. (2009). Substance use disorders in perpetrators of intimate partner violence in a forensic setting. *International Journal of Offender Therapy and Comparative Criminology, 54*, 430-440. doi:10.1177/0306624X08330189

Krank, M., Stewart, S. H., O'Connor, R., Woicik, P. B., Wall, A.-M., & Conrod, P. J. (2011). Structural, concurrent, and predictive validity of the Substance Use Risk Profile Scale in early adolescence. *Journal of Addictive Behaviours, 26*, 37-46. doi:10.1016/j.addbeh.2010.08.010

Kromrey, J. D., & LaRocca, M. (1995). Power and type I error rates of new pairwise multiple comparison procedures under heterogeneous variances. *Journal of Experimental Education, 63*, 343-362.

Krueger, R. F., & Markon, K. E. (2006a). Reinterpreting comorbidity: A model-based approach to understanding and classifying psychopathology. *Annual Review of Clinical Psychology, 2*, 111-133. doi:10.1146/annurev.clinpsy.2.022305.095213

Krueger, R. F., & Markon, K. E. (2006b). Understanding psychopathology: Melding behaviour genetics, personality, and quantitative psychology to develop an empirically based model. *Current Directions in Psychological Science, 15*(3), 113-117.

Krueger, R. F., Markon, K. E., Patrick, C. J., Benning, S. D., & Kramer, M. D. (2007). Linking antisocial behaviour, substance use, and personality: An integrative

quantitative model of the adult externalizing spectrum. *Journal of Abnormal Psychology, 116*(4), 645-666. doi:10.1037/0021-843X.116.4.645

Krueger, R. F., Markon, K. E., Patrick, C. J., & Iacono, W. G. (2005). Externalizing psychopathology in adulthood: A dimensional-spectrum conceptualization and its implications for DSM-V. *Journal of Abnormal Psychology, 114*, 537-550. doi:10.1037/0021-843X.114.4.537

Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006). Replication and validation of the Drinking Motive Questionnaire Revised (DMQ-R, Cooper, 1994) among adolescents in Switzerland. *European Addiction Research, 12*(3), 161-168. doi:10.1159/000092118

Kushner, M. G., Sher, K. J., & Beitman, B. D. (1990). The relation between alcohol problems and the anxiety disorders. *The American Journal of Psychiatry, 147*(6), 685-695.

Lafortune, D. (2010). Prevalence and screening of mental disorders in short-term correctional facilities. *International Journal of Law and Psychiatry, 33*(2), 94-100. doi:10.1016/j.ijlp.2009.12.004

Langas, A-M., Malt, U. F., & Opjordsmoen, S. (2011). Comorbid mental disorders in substance users from a single catchment area: A clinical study. *BMC Psychiatry, 11*(25), 1-12. doi:10.1186/1471-244X/11/25

Laslett, A.-M., Room, R., Ferris, J., Wilkinson, C., Livingston, M., & Mugavin, J. (2011). Surveying the range and magnitude of alcohol's harm to others in Australia. *Addiction, 106*, 1603-1611. doi:10.1111/j.1360-0443.2011.03445.x

Lavery, R. (2011, September). *An animated guide: An introduction to latent class clustering in SAS*. Paper presented at the 23rd Annual NorthEast SAS Users Group Conferences, Portland, ME.

Lefaivre, M., Watt, M. C., Stewart, S. H., & Wright, K. D. (2006). Implicit associations between anxiety-related symptoms and catastrophic consequences in high anxiety sensitive individuals. *Cognition and Emotion, 20*(2), 295-308. doi:10.1080/02699930500336466

Leggio, L., Kenna, G. A., Fenton, M., Bonenfant, E., & Swift, R. M. (2009). Typologies of alcohol dependence: From Jellinek to genetics and beyond. *Neuropsychology Review, 19*, 115-129. doi:10.1007/sl1065-008-9080-z

Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology, 68*(1), 151-158.

Lewis, M. J. (1996). Alcohol reinforcement and neuropharmacological therapeutics. *Alcohol & Alcoholism, 31*(suppl. 1), 17-25.

Lightfoot, L., & Hodgins, D. C. (1993). Characteristics of substance-abusing offenders: Implications for treatment programming. *International Journal of Offender Therapy and Comparative Criminology, 37*(3), 239-250. doi:10.1177/0306624X9303700305

Lilienfeld, S. O., & Penna, S. (2001). Anxiety sensitivity: Relations to psychopathy, DSM-IV personality disorder features, and personality traits. *Anxiety Disorders, 15*, 367-393. doi:10.1016/S0887-6185(01)00070-6

Luthar, S.S., Cushing, G., & Rounsaville, B. J. (1996). Gender differences among opioid abusers: Pathways to disorder and profiles of psychopathology. *Drug and Alcohol Dependence, 43*(3), 179-189. doi:10.1016/S0376-8716(96)01310-5

Lynam, D. R., Whiteside, S., & Jones, S. (1999). Self-reported psychopathy: A validation study. *Journal of Personality Assessment, 73*(1), 110-132. doi:10.1207/S15327752JPA730108

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*(2), 130-149.

Mackie, C.J., Castellanos-Ryan, N., & Conrod, P.J. (2011). Personality moderates the longitudinal relationship between psychological symptoms and alcohol use in adolescents. *Alcoholism: Clinical and Experimental Research, 35*(4), 703-716. doi:10.1111/j.1530-0277.2010.01388.x

MacPherson, P. (2001). Random urinalysis program: Policy, practice, and research results. *Forum on Corrections Research Focusing on Alcohol and Drugs, 13*(3), 54-57.

MacPherson, P. (2004). *Use of random urinalysis to deter drug use in prison: A review of the issues* (Addictions Research Branch Publication No. 2004 No R-149). Ottawa, ON: Correctional Service of Canada.

Magidson, J., & Vermunt, J. K. (2002). Latent class models for clustering: A comparison with K-means. *Canadian Journal of Marketing Research, 20*(1), 37-44.

Maisto, S. A., Conigliaro, J. C., Gordon, A. J., McGinnis, K. A., & Justice, A. C. (2008). An experimental study of the agreement of self-administration and

telephone administration of the timeline followback interview. *Journal of Studies on Alcohol and Drugs, 69*(3), 468-471.

Malmberg, M., Overbeek, G., Monshouwer, K., Lammer, J., Vollebergh, W. A. M., & Engels, R. C. M. E. (2010). Substance Use Risk Profiles and associations with early substance use in adolescence. *Journal of Behavioural Medicine, 33*, 474-485. doi:10.1007/s10865-010-9278-4

Marlatt, G. A., & Witkiewitz, K. (2005). Relapse prevention for alcohol and drug problems. In G. A. Marlatt & D. M. Donovan (Eds.), *Relapse prevention: Maintenance strategies in the treatment of addictive behaviours (2nd ed)* (pp. 1-44). New York: The Guilford Press.

Martel, M. M., Pierce, L., Nigg, J. T., Jester, J. M., Adams, K., Puttler, L. I., ... Zucker, R. A. (2009). Temperament pathways to childhood disruptive behaviour and adolescent substance abuse: Testing a cascade model. *Journal of Abnormal Child Psychology, 37*, 363-373. doi:10.1007/s10802-008-9269-x

Martin, M., Hurley, R. A., & Taber, K. H. (2007). Is opiate addiction associated with longstanding neurobiological changes? *The Journal of Neuropsychiatry and Clinical Neurosciences, 19*(3), 242-248. doi:10.1176/appi.neuropsych.19.3.242

Martin, K., & Stermac, L. (2010). Measuring hope: Is hope related to criminal behaviour in offenders? *International Journal of Offender Therapy and Comparative Criminology, 54*, 693-705. doi:10.1177/0306624X09336131

Martins, S. S., & Gorelick, D. A. (2011). Conditional substance abuse and dependence by diagnosis of mood or anxiety disorder or schizophrenia in the U.S. population.

Drug and Alcohol Dependence, 119(1-2), 28-36. doi:10.1016/j.drugalcdep.2011.05.010

Martinson, R. M. (1974). What works? Questions and answers about prison reform. *The Public Interest, 35,* 22-54.

McCarthy, D., Edmundson, E., & Hartnett, T. (2006). Charting a path between research and practice in alcoholism treatment. *Alcohol Research & Health, 29*(1), 5-10.

McCarthy, S., & Waters, T. F. (2003). Treating substance abuse offenders in the southwestern United States: A report evaluating the long-term effectiveness of the Yuma county adult drug court. *Journal of Offender Rehabilitation, 37*(3-4). 163-177. doi:10.1300/J076v37n03_09

McCollister, K. E., French, M. T., Inciardi, J. A., Butzin, C. A., Martin, S. S., & Hooper, R. M. (2003). Post-release substance abuse treatment for criminal offenders: A cost-effectiveness analysis. *Journal of Quantitative Criminology, 19*(4), 389-407. doi:10.1023/B:JOQC.0000005441.49529.61

McDonough, J. (2009). Building on success: The next chapter in effective correctional programming. *Let's Talk, 34*(1), 20-21.

McEvoy, P. M., & Shand, F. (2008). The effect of comorbid substance use disorders on treatment outcome for anxiety disorders. *Journal of Anxiety Disorders, 22*(6), 1087-1098. doi:10.1016/j.janxdis.2007.11.007

McKim, W. A. (2007). *Drugs and behavior: An introduction to behavioral pharmacology* (6th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

McMurran, M. (2007). What works in substance misuse treatments for offenders? *Criminal Behaviour and Mental Health, 17,* 225-233. doi:10.1002/cbm.662

Meszaros, K. U., Lenzinger, E., Hornik, K., Fureder, T., Willinger, U,. Fischer, G., ... Aschauer, H. N. (1999). The Tridimensional Personality Questionnaire as a predictor of relapse in detoxified alcohol dependents. *Alcoholism: Clinical and Experimental Research, 23*(3), 483-486. doi:10.1097/00000374-19990300-00015

Millon, T. (1994). *Millon Index of Personality Styles (MIPS) manual*. San Antonio, TX: Psychological Corporation.

Millon, T., & Davis, R. D. (1997). The MCMI-III: Present and future directions. *Journal of Personality Assessment, 68*(1), 69-85. doi:10.1207/s15327752jpa6801_6

Miner, M. H. (2002). Factors associated with recidivism in juveniles: An analysis of serious juvenile sex offenders. *Journal of Research in Crime and Delinquency, 39*, 421-436. doi:10.1177/002242702237287

Mitchell, J. D., Brown, E. S., & Rush, A. J. (2007). Comorbid disorders in patients with bipolar disorder and concomitant substance dependence. *Journal of Affective Disorders, 102*(1-3), 281-287. doi:10.1016/j.jad.2007.01.005

Moeller, F. G., Dougherty, D. M., Barratt, E. S., Schmitz, J. M., Swann, A. C., & Grabowski, J. (2001). The impact of impulsivity on cocaine use and retention in treatment. *Journal of Substance Abuse Treatment, 21*, 193-198. doi:10.1016/S0740-5472(01)00202-1

Moffitt, T. E. (1993). Adolescence-limited and life-course persistent antisocial behaviour: A developmental taxonomy. *Psychological Review, 100*, 674-701. doi:10.1037/0033-295X.100.4.674

Morey, L. C. (2003). *Essentials of PAI assessment*. Hoboken, NJ: John Wiley & Sons, Inc.

Morgan, R. D., & Flora, D. B. (2002). Group psychotherapy with incarcerated offenders: A research synthesis. *Group Dynamics, 6*, 203-218. doi:10.1037/1089-2699.6.3.203

Moss, H. B., Chen, C. M., & Yi, H-Y. (2007). Subtypes of alcohol dependence in a nationally representative sample. *Drug and Alcohol Dependence, 91*, 149-158. doi:10.1016/j.drugalcdep.2007.05.016

Motiuk, L. L., & Vuong, B. (2005*). Research brief - homicide, sex, robbery and drug offenders in federal corrections: An end-of-2004 review*. Ottawa, ON, Canada: Correctional Service of Canada.

Meuller, R. O., & Hancock, G. R. (2008). Best practices in structural equation modeling. In J. W. Osborne (Ed.), *Best practices in quantitative methods* (pp. 488-508). Thousand Oaks, CA: Sage Publications, Inc.

Mueser, K. T., Drake, R. E., & Wallach, M. A. (1998). Dual diagnosis: A review of etiological theories. *Journal of Addictive Behaviours, 23*(6), 717-734.

Mugele, J., Nanagas, K. A., Tormoehlen, L. M. (2012). Serotonin syndrome associated with MDPV: A case report. *Annals of Emergency Medicine, 60,* 100-102. doi:10.1016/j.annemergmed.2011.11.033

Mullen, P. E., Burges, P., Wallace, C., Palmer, S., & Ruschena, D. (2000). Community care and criminal offending in schizophrenia. *The Lancet, 355*(9204), 614-617. doi:10.1016/S0140-6736(99)05082-5

Muller, J. L., Sommer, M., Dohnel, K., Weber, T., Schmidt-Wilcke, T., & Hajak, G. (2008). Disturbed prefrontal and temporal brain function during emotion and

cognition interaction in criminal psychopathy. *Behavioural Sciences and the Law, 26*, 131-150. doi:01.1002/bsl.796

Mushquash, C. J., Comeau, M. N., & Stewart, S. H. (2007). An alcohol abuse early intervention approach with Mi'kmaq adolescents. *First Peoples Child & Family Review, 3*(1), 17-26.

Neale, M. C., & Kendler, K. S. (1995). Models of comorbidity for multifactorial disorders. *American Journal of Human Genetics, 57*(4), 935-953.

Nebbitt, V. E., Lombe, M., & Williams, J. H. (2008). Assessing the moderating effects of anxiety sensitivity on antisocial behaviour among urban African American youth. *Journal of Health Care for the Poor and Underserved, 19*, 277-293. doi:10.1353/hpu.2008.0023

Ness, M. L., & Oei, T. P. S. (2005). The effectiveness of an inpatient group cognitive behavioural therapy program for alcohol dependence. *The American Journal on Addictions, 14*, 139-154. doi:10.1080/10550490590924773

Neumann, C. S., Johansson, P. T., & Hare, R. D. (2013). The Psychopathy Checklist-revised (PCL-R), low anxiety, and fearlessness: A structural equation modeling analysis. *Personality Disorders: Theory, Research, and Treatment, 4*, 129-137. doi:10.1037/a0027886

Newberry, M., & Shuker, R. (2012). Personality Assessment Inventory (PAI) profiles of offenders and their relationship to institutional misconduct and risk of reconviction. *Journal of Personality Assessment, 94*, 586-592. doi:10.1080/00223891.2012.669220

Nietert, P. J., French, M. T., Kirchner, J. E., & Booth, B. M. (2007). Utilization and cost of mental health, substance abuse, and medical services among at-risk drinkers. *Medical Care Research and Review, 64*(4), 431-448. doi:10.1177/1077558707301962

Nixon, S. J., & Parsons, O. A. (1990). Application of the Tridimensional Personality Questionnaire to a population of alcoholics and other substance abusers. *Alcoholism: Clinical & Experimental Research, 14*(4), 513-517. doi:10.1111/j.1530-0277.1990.tb01190.x

Nock, M. K., Hwang, I., Sampson, N. A., & Kessler, R. C. (2010). Mental disorders, comorbidity and suicidal behaviour: Results from the National Comorbidity Survey replication. *Molecular Psychiatry, 15*(8), 868-876. doi:10.1038/mp.2009.29

Norberg, M. M., Mackenzie, J., & Copeland, J. (2012). Quantifying cannabis use with the timeline followback approach: A psychometric evaluation. *Drug and Alcohol Dependence, 121*, 247-252. doi:10.1016/j.drugalcdep.2011.09.007

Norusis, M. (2012). *IBM SPSS statistics 19 statistical procedures companion* (pp. 375-404). Boston: Pearson Education Inc.

O'Connor, R. M., & Colder, C. R. (2005). Predicting alcohol patterns in first-year college students through motivational systems and reasons for drinking. *Psychology of Addictive Behaviours, 19*(1), 10-20. doi:10.1037/0893-164X.19.1.10

O'Leary-Moore, S. K., Galloway, M. P., McMechan, A. P., Irtenkauf, S., Hannigan, J. H., & Bowen, S. E. (2009). Neurochemical changes after acute binge toluene inhalation in adolescent and adult rats: A high-resolution magnetic resonance

spectroscopy study. *Neurotoxicology and Teratology, 31*(6), 382-389. doi:10.1016/j.ntt.2009.2007.07.005

Olver, M. E., Stockdale, K. C., & Wormith, J. S. (2011). A meta-analysis of predictors of offender treatment attrition and its relationship to recidivism. *Journal of Consulting and Clinical Psychology, 79*, 6-21. doi:10.1037/a0022200

Ouimette, P. C., Ahrens, C., Moos, R. H., & Finney, J. W. (1998). During treatment changes in substance abuse patients with posttraumatic stress disorder: The influence of specific interventions and program environments. *Journal of Substance Abuse Treatment, 15*(6), 555-564. doi:10.1016/S0740-5472(97)00315-2

Palermo, G. B. (2011). Prisoner misbehaviour. *International Journal of Offender Therapy and Comparative Criminology, 55*, 1183-1185. doi:10.1177/0306624X11425780

Papac, D. I., & Foltz, R. L. (1990). Measurement of lysergic acid diethylamide (LSD) in human plasma by gas chromatogaphy/negative ion chemical ionization mass spectrometry. *Journal of Analytical Toxicology, 14*(3), 189-190.

Parker, J. D. A., Bagby, R. M., & Joffe, R. T. (1996). Validation of the biosocial model of personality: Confirmatory factor analysis of the Tridimensional Personality Questionnaire. *Psychological Assessment, 8*(2), 139-144. doi:10.1037/1040-3590.8.2.1.9

Parsian, A., & Cloninger, C. R. (2001). Serotonergic pathway genes and subtypes of alcoholism: Association studies. *Psychiatric Genetics, 11*(2), 89-94. doi:10.1097/00041444-200106000-00006

Passetti, F., Clark, L., Mehta, M. A., Joyce, E., & King, M. (2008). Neuropsychological predictors of clinical outcome in opiate addiction. *Drug and Alcohol Dependence, 94*(1-3), 82-91. doi:10.1016/j.drugalcdep.2007.10.008

Pearson, C., Janz, T., & Ali, J. (2013). Mental and substance use disorders in Canada. *Health at a Glance, Catalogue no. 82-624-X*. Statistics Canada: Ottawa, ON.

Pedersen, E. R., Grow, J., Duncan, S., Neighbors, C., & Larimer, M. E. (2012). Concurrent validity of an online version of the timeline followback assessment. *Psychology of Addictive Behaviours*. Advance online publication. doi:10.1037/a0027945

Pedersen, E. R., & LaBrie, J. W. (2006). A within-subjects validation of a group-administered timeline followback for alcohol use. *Journal of Studies on Alcohol and Drugs, 67*(2), 332-335.

Pelissier, B., Wallance, S., O'Neil, J. A., Gaes, G., Camp, S., Rhodes, W., & Saylor, W. (2001). Federal prison residential drug treatment reduces substance use and arrests after release. *American Journal of Drug and Alcohol Abuse, 27*(2), 315-337. doi:10.1081-ADA-100109712

Penick, E. C., Powell, B. J., Nickel, E. J., Read, M. R., & Gabrielli, W. F., & Liskow, B. I. (1990). Examination of Cloninger's type I and type II alcoholism with a sample of men alcoholics in treatment. *Alcoholism: Clinical & Experimental Research, 14*(4), 623-629. doi:10.1111/j.1530-0277.1990.tb01213.x

Peters, R. H. (1993). Substance abuse services in jails and prisons. *Law & Psychology Review, 17*, 85-116.

Peters, R. H., Greenbaum, P. E., Steinberg, M. L., Carter, C. R., Ortiz, M. M., Fry, B. C., & Valle, S. K. (2000). Effectiveness of screening instruments in detecting substance use disorders among prisoners. *Journal of Substance Abuse Treatment, 18*(4), 349-358. doi:10.1016/S0740-5472(99)00081-1

Pihl, R. O., & Peterson, J. B. (1995). Alcoholism: The role of different motivational systems. *Journal of Psychiatry and Neuroscience, 20*(5), 372-396.

Polaschek, D. L. L. (2012). An appraisal of the risk-need-responsivity (RNR) model of offender rehabilitation and its application in correctional treatment. *Legal and Criminological Psychology, 17,* 1-17. doi:10.1111/j.2044-8333.2011.02038.x

Prendergast, M., Podus, D., Finney, J., Greenwell, L., & Roll, J. (2006). Contingency management for treatment of substance use disorders: A meta-analysis. *Addiction, 101,* 1546-1560. doi:10.1111/j.1360-0443.2003.01581.x

Prentky, R. A., Knight, R. A., Lee, A. F. S., & Cerce, D. D. (1995). Predictive validity of lifestyle impulsivity for rapists. *Criminal Justice and Behaviour, 22,* 106-128. doi:10.1177/0093854895022002002

RachBeisel, J., Scott, J., & Dixon, L. (1999). Co-occurring severe mental illness and substance use disorders: A review of recent research. *Psychiatric Services, 50*(11), 1427-1434.

Raine, A., Lencz, T., Bihrle, S., LaCasse, L., & Coleltti, P. (2000). Reduced prefrontal gray matter volume and reduced autonomic activity in antisocial personality disorder. *Archives of General Psychiatry, 57*(2), 119-127. doi:10.1001/archpsyc.57.2.119

Read, J. P., Wood, M. D., Kahler, C. W., Maddock, J. E., & Palfai, T. P. (2003). Examining the role of drinking motives in college student alcohol use and problems. *Psychology of Addictive Behaviours, 17*(1), 13-23. doi:10.1037/0893-164X.17.1.13

Reedy, A. R., & Hall, J. A. (2008). Treatment issues with substance use disorder clients who have mood or anxiety disorders. *Mental Health and Substance Use: Dual Diagnosis, 1*(1), 44-53. doi:10.1080/17523280701741738

Regier, D. A., Farmer, M. E., Rae, D. S., Locke, B. Z., Keith, S. J., & Judd, L. L. (1990). Comorbidity of mental disorders with alcohol and other drug abuse: Results from the Epidemiologic Catchment Area (ECA) Study. *The Journal of the American Medical Association, 264*(19), 2511-2518. doi:10.1001/jama.1990.03450190043026

Regier, D. A., Farmer, M. E., Rae, D. S., Myers, J. K., Kramer, M., Robins, L. N., ... Locke, B. Z. (1993). One-month prevalence of mental disorders in the United States and sociodemographic characteristics: The Epidemiological Catchment Area study. *Acta Psychiatrica Scandinavica*, *88*(1), 35-47.

Rehm, J., Ballunas, D., Brochu, S., Fisher, B., Gnam, W., Patra, J., ... Taylor, B. (2006). The costs of substance abuse in Canada 2002: Highlights. *Canadian Substance Abuse Cost Study*. Retrieved from: http://www.ccsa.ca/2006%20CCSA%20Documents/ccsa-011332-2006.pdf

Rehm, J., Mather, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic cost attributable

to alcohol use and alcohol-use disorders. *The Lancet, 373*, 2223-2233. doi:10.1016/S0140-6736(09)60746-7

Retzlaff, P., Stoner, J., & Kleinsasser, D. (2002). The use of the MCMI-III in the screening and triage of offenders. *International Journal of Offender Therapy and Comparative Criminiology, 46*(3), 319-332. doi:10.1177/0306624X02463006

Rezansoff, S. N., Moniruzzaman, A., Gress, C., & Somers, J. M. (2013). Psychiatric diagnoses and multiyear criminal recidivism in a Canadian provincial offender population. *Psychology, Public Policy, and Law, 19*, 443-453. doi:10.1037/a0033907

Rist, F., Randall, C. L., Heather, N., & Mann, K. (2005). New developments in alcoholism treatment research in Europe. *Alcoholism: Clinical & Experimental Research, 29*(6), 1127-1132. doi:10.1097/01.ALC.0000167969.15829.32

Roberts, A. H., & Erikson, R. V. (1974). Demographic variables, base rates, and personality characteristics associated with recidivism in male delinquents. *Journal of Consulting and Clinical Psychology, 42*, 833-841. doi:10.1037/h0037565

Rosenthal, R. N., Brady, K. T., Levounis, P., & Willenbring, M. L. (2007). Advances in the treatment of alcohol dependence: The armamentarium for treating alcohol dependence and its impact on clinical practice and patient outcomes. *Journal of Clinical Psychiatry, 68*(7), 1117- 1128. doi:10.4088/JCP.v68n0721

Roy, M., Dum, M., Sobell, L. C., Sobell, M. B., Simco, E. R., Manor, H., & Palmerio, R. (2008). Comparison of the Quick Drinking Screen and the alcohol timeline followback with outpatient alcohol abusers. *Substance Use & Misuse, 43*, 2116-2123. doi:10.1080/10826080802347586

Rush, B., & Koegl, C. J. (2008). Prevalence and profile of people with co-occurring mental and substance use disorders within a comprehensive mental health system. *Canadian Journal of Psychiatry, 53*, 810-821.

Rush, B., Urbanoski, K., Bassani, D., Castel, S., Wild, T. C., Strike, C. ... & Somers, J. (2008). Prevalence of co-occurring substance use and other mental disorders in the Canadian population. *Canadian Journal of Psychiatry, 53*(12), 800-809.

Ryba, N. L. (2008). Cognitive-behavioural therapy for offender hopelessness: Lessons from treatment of forensic inpatients. *Journal of Contemporary Psychotherapy, 38*, 73-80. doi:10.1007/s10879-007-9070-0

Sampson, R. J., Laub, J. H. (2003). Life-course desisters? Trajectories of crime among delinquent boys followed to age 70. *Criminology, 41*(3), 555-592. doi:10.1177/0002716205280075

Sarchiapone, M., Jovanovic, N., Roy, A., Podlesek, A., Carli, V., Amore, M., ... & Marusic, A. (2009). Relations of psychological characteristics to suicide behaviour: Results from a large sample of male prisoners. *Personality and Individual Differences, 47*, 250-255. doi:10.1016/j.paid.2009.03.008

Saulsman, L. M. (2011). Depression, anxiety, and the MCMI-III: Construct validity and diagnostic efficiency. *Journal of Personality Assessment, 93*(1), 76-83. doi:10.1080/00223891.2010.528481

Saunders, K. W., Von Korff, M., Campbell, C. L., Banta-Green, C. J., Sullivan, M. D., Merrill, J. O., & Weisner, C. (2012). Concurrent use of alcohol and sedatives among persons prescribed chronic opioid therapy: Prevalence and risk factors. *The Journal of Pain, 12*(3), 266-275. doi:10.1016/j.pain.2011.11.004

Schoenberg, M. R., Dorr, D., Morgan, C., & Burke, M. (2004). Comparison of the MCMI-III personality disorder and modifier indices with the MMPI-2 clinical and validity scales. *Journal of Personality Assessment, 82*(3), 273-280. doi:10.1207s1527752jpa8203_3

Schuckit, M. A., Tipp, J. E., Smith, T. L., Shapiro, E., Hesselbrock, V. M., Bucholz, K. K., ... Nurnberger, J. I. Jr. (1995). An evaluation of Type A and B alcoholics. *Addiction, 90*(9), 1189-1203. doi: 10.1111/j.1360-0443.1995.tb.0189.x

Sellbom, M., Smid, W., de Saeger, H., Smit, N., & Kamphuis, J. H. (2013). Mapping the personality psychopathology five domains onto DSM-IV personality disorders in Dutch clinical and forensic samples: Implications for DSM-5. *Journal of Personality Assessment, 96*, 1-7. doi:10.1080/00223891.2013.825625

Setiawan, E., Pihl, R. O., Cox, S. L., Gianoulakis, C., Palmour, R. M., Benkelfat, C., & Leyton, M. (2011). The effect of naltrexone on alcohol's stimulant properties and self-administration behaviour in social drinkers: Influence of gender and genotype. *Alcoholism: Clinical and Experimental Research, 35*(6), 1134-1141. doi:10.1111/j.1530-0277.2011.01446.x

Sher, K. J., Wood, M. D., Crews, T. M., Vandiver, P. A. (1995). The Tridimensional Personality Questionnaire: Reliability and validity studies and derivation of a short form. *Psychological Assessment, 7*(2), 195-208. doi:10.1037/1040-3590.7.2.195

Sherry, A., & Henson, R. K. (2005). Conducting and interpreting canonical correlation analysis in personality research: A user-friendly primer. *Journal of Personality Assessment*, 84, 37-48. doi:10.1207/s15327752jpa8401_09

Siegfried, N. (1998). A review of comorbidity: Major mental illness and problematic substance use. *Australian and New Zealand Journal of Psychiatry, 32*(5), 707-717. doi:10.3109/00048679809113127

Sijtsema, J. J., Veenstra, R., Lindenberg, S., van Roon, A. M., Verhulst, F. C., Ormel, J., & Riese, H. (2010). Mediation of sensation seeking and behavioural inhibition on the relationship between heart rate and antisocial behaviour: The TRAILS study. *Journal of the American Academy of Child & Adolescent Psychiatry, 49*, 493-502. doi:10.1097/00004583-201005000-00010

Simons, J., Correia, C. J., Carey, K. B., & Borsari, B. E. (1998). Validating a five-factor marijuana motives measure: Relations with use, problems, and alcohol motives. *Journal of Counseling Psychology, 45*(3), 265-273. doi:10.1037/0022-0167.45.3.265

Singer, M. (2009). *Introduction to syndemics*. San Francisco, CA: Jossey-Bass.

Siu, A. F. Y. (2011). Validation of the Substance Use Risk Profile Scale for adolescents in Hong Kong. *Journal of Psychoeducational Assessment, 29*(1), 75-83. doi:10.1177/0734282910362044

Skinner, B. F. (1963). Operant behaviour. *American Psychologist, 18*(8), 503-515. doi:10.1037/h0045185

Skopp, N. A., Edens, J. F., & Ruiz, M. A. (2007). Risk factors for institutional misconduct among incarcerated women: An examination of the criterion-related validity of the Personality Assessment Inventory. *Journal of Personality Assessment, 88*, 106-117. doi:10.1080/00223890709336841

Skov-Ettrup, L. S., Eliasen, M., Ekholm, O., Gronbaek, M., & Tolstrup, J. S. (2011). Binge drinking, drinking frequency, and risk of ischaemic heart disease: A population-based cohort study. *Scandinavian Journal of Public Health, 39*(8), 880-887. doi:10.1177/1403494811425605

Smetanin, P., Stiff, D., Briante, C., Adair, C. E., Ahmad, S., & Khan, M. (2011). The life and economic impact of major mental illness in Canada: 2011 to 2041. *RiskAnalytica,* 1-199, The Mental Health Commission of Canada 2011.

Smith, J. P., & Book, S. W. (2010). Comorbidity of generalized anxiety disorder and alcohol use disorders among individuals seeking outpatient substance abuse treatment. *Journal of Addictive Behaviours, 35*(1), 42-45. doi:10.1016/j.addbeh.2009.07.002

Sobell, L. C., & Sobell, M. B. (1996). *Timeline follow back manual.* Ontario: Addiction Research Foundation.

Spencer, C., Castle, D., & Michie, P. T. (2002). Motivations that maintain substance use among individuals with psychotic disorders. *Schizophrenia Bulletin, 28*(2), 233-247.

Stewart, C. (2009). The co-relation of alcoholics anonymous participation to alcohol and other drug treatment outcomes. *Alcoholism Treatment Quarterly, 27*(1), 19-37. doi:10.1080/07347320802586684

Stewart, S. H. (2013, January). *A personality-matched approach to the treatment and prevention of substance misuse*. Keynote presented at MDQuit's 7th Annual Best Practices Conference, Ellicott City, MD.

Stewart, S. H., Karp, J., Pihl, R. O., & Peterson, R. A. (1997). Anxiety sensitivity and self-reported reasons for drug use. *Journal of Substance Abuse, 9,* 223-240. doi:10.1016/S0899-3289(97)90018-3

Stewart, S. H., Peterson, J. B., & Pihl, R. O. (1995). Anxiety sensitivity and self-reported alcohol consumption rates in university women. *Journal of Anxiety Disorders, 9,* 283-292. doi:10.1016/0887-6185(95)00009-D

Stewart, S. H., & Zeitlin, S. B. (1995). Anxiety sensitivity and alcohol use motives. *Journal of Anxiety Disorders, 9*(3), 229-240. doi:10.1016/0887-6185(95)00004-8

Stewart, S. H., Zeitlin, S. B., & Samoluk, S. B. (1996). Examination of a three-dimensional Drinking Motives Questionnaire in a young adult university student sample. *Behaviour Research and Therapy, 34*(1), 61-71. doi:10.1016/j.addbeh.2007.07.004

Strack, S., & Million,T. (2007). Contributions to the dimensional assessment of personality disorders using Million's model and the Millon Clinical Multiaxial Inventory (MCMI-III). *Journal of Personality Assessment, 89*(1), 56-69. doi:10.1080/00223890701357217

Strang, J., Bearn, J., Farrell, M., Finch, E., Gossop, M., Griffiths, P., ... Wolff, K. (1998). Route of drug use and its implications for drug effect, risk of dependence and health consequences. *Drug and Alcohol Review, 17*(2), 197-211. doi:10.1080/09595239800187001

Storvik, M., Haukijarvi, T., Tupala, E., & Tiihonen, J. (2008). Correlation between the SERT binding densities in the hypothalamus and amygdala in the Cloninger Type 1 and 2 alcoholics. *Alcohol and Alcohoism, 43,* 25-30. doi:10.1093/alcalc/agm157

Sung, M., Erkani, A., Angold, A., & Costello, E. J. (2004). Effects of age at first substance use and psychiatric comorbidity on the development of substance use disorders. *Drug and Alcohol Dependence, 75*, 287-299. doi:10.1016/j.drugalcdep.2004.03.013

Sussman, S., Simon, T. R., Dent, C. W., Steinberg, J. M., & Stacy, A. W. (1999). One-year prediction of violence perpetration among high-risk youth. *The American Journal of Health Behaviour, 23*, 332-344. doi:10.5993/AJHB.23.5.2

Swann, A. C., Lijffijt, M., Lane, S. D., Steinberg, J. L., & Moeller, G. (2009). Trait impulsivity and response inhibition in antisocial personality disorder. *Journal of Psychiatric Research, 43*, 1057-1063. doi:10.1016/j.jpsychires.2009.03.003

Swendsen, J., Conway, K. P., Degenhardt, L., Glantz, M., Jin, R., Merikangas, K. R., ... Kessler, R. C. (2010). Mental disorders as risk factors for substance use, abuse and dependence: Results from the 10-year follow-up of the National Comorbidity Survey. *Addiction, 105*, 1117-1128. doi:10.1111/j.1360-0443.2010.02902.x

Taxman, F. S., & Thanner, M. (2006). Risk, needs, and responsivity (RNR): It all depends. *Crime & Delinquency, 52*, 28-51. doi:10.1177/0011128705281754

Thornton, L. K., Baker, A. L., Johnson, M. P., Kay-Lambkin, F., & Lewin, T. J. (2011). Reasons for substance use among people with psychotic disorders: Method triangulation approach. *Psychology of Addictive Behaviors*, Advanced online publication. doi:10.1037/a0026469

Tripodi, S. J., & Bender, K. (2011). Substance abuse treatment for juvenile offenders: A review of quasi-experimental and experimental research. *Journal of Criminal Justice, 39*, 246-252. doi:10.1016/j.crimjus.2011.02.007

Ullman, J. B. (2007). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (Eds.), *Using multivariate statistics* (pp. 676-780) (5th ed.). Boston: Pearson Education Inc.

U.S. Department of Health and Human Services (2009). Cost offset of treatment services. *Substance Abuse and Mental Health Services Administration Centre for Substance Abuse Treatment*. Retrieved from: www.samhsa.gov

Veldhuizen, S., Urbansoki, K., & Cairney, J. (2007). Geographical variation in the prevalence of problematic substance use in Canada. *Canadian Journal of Psychiatry, 52*(7), 426-433.

Vermunt, J. K., & Magidson, J. (2002). Latent class cluster analysis. In J. A. Hagenaars, & A. L. McMutcheon (Eds.), *Applied latent class analysis* (pp. 89-106). New York: Cambridge University Press.

Verona, E., Joiner, T. E., & Patrick, C. J. (2001). Psychopathy, antisocial personality, and suicide risk. *Journal of Abnormal Psychology, 110*, 462-470. doi:10.1037//0021-843X.110.3.462

Vezina, P. (2004). Sensitization of midbrain dopamine neuron reactivity and the self-administration of psychomotor stimulant drugs. *Neuroscience & Biobehavioral Reviews, 27*(8), 827-839. doi:10.1016/j.neubiorev.2003.11.001

von Diemen, L., Bassani, D. G., Fuchs, S. C., Szobot, M., & Pechansky, F. (2008). Impulsivity, age of first alcohol use and substance use disorders among male adolescents: A population based case-control study. *Addiction, 103*, 1198-1205. doi:10.1111/j.1360-0443.2008.02223.x

Wagner, M. K. (2001). Behavioural characteristics related to substance abuse and risk-taking, sensation-seeking, anxiety sensitivity, and self-reinforcement. *Addictive Behaviours, 26*, 115-120. doi:10.1016/S0306-4603(00)00071-X

Wallace, J. F., Malterer, M. B., & Newman, J. P. (2009). Mapping Gray's BIS and BAS constructs onto factor 1 and factor 2 of Hare's Psychopathy Checklist-Revised. *Personality and Individual Differences, 47*, 812-816. doi:10.1016/j.paid.2009.06.0.19

Walters, G. D. (2002). Lessons learned from project MATCH. *Addiction Disorders & Their Treatment, 1*(4), 135-139. doi:10.1097/00132576-200211000-00004

Walters, G. D., Brinkley, C. A., Magaletta, P. R., & Diamond, P. M. (2008). Taxometric analysis of the Levenson Self-Report Psychopathy scale. *Journal of Personality Assessment, 90*(5), 491-498. doi:10.1080/00223890802248828

Walters, G. D., & Crawford, G. (2013). In and out of prison: Do importation factors predict all forms of misconduct or just the more serious ones? *Journal of Criminal Justice, 41*, 407-413. doi:10.1016/j.crimjus.2013.08.001

Ward, C. L., Kersh, B. C., Shanks, D. (1997). Psychometric assessment of motives for using cocaine in men with substance use disorders. *Psychological Reports, 80*(1), 189-190. doi:10.2466/PR0.80.1.189-190.

Ward, T., Mesler, J., & Yates, P. (2007). Reconstructing the risk-need-responsivity model: A theoretical elaboration and evaluation. *Aggression and Violent Behaviour, 12*, 208-228. doi:10.1016/j.avb.2006.07.001

Wareham, J., Dembo, R., Poythress, N. G., Childs, K., & Schmeidler, J. (2009). A latent class factor approach to identifying subtypes of juvenile diversion youths based on

psychopathic features. *Behavioural Sciences and the Law, 27*, 71-95. doi:10.1002/bsl.844

Watkins, K. E., Hunter, S. B., Hepner, K. A., Paddock, S. M., de la Cruz, E., Zhou, A. J., & Gilmore, J. (2011). An effectiveness trial of group cognitive behavioural therapy for patients with persistent depressive symptoms in substance abuse treatment. *Archives of General Psychiatry, 68*(6), 577-584. doi: 10.1001/archgenpsychiatry.2011.53

Watt, M. C., Stewart, S. H., Lefaivre, M.-J., & Uman, L. S. (2006). A brief cognitive-behavioural approach to reducing anxiety sensitivity decreases pain-related anxiety. *Cognitive Behaviour Therapy, 35,* 248-256. doi:10.1080/16506070600898553

Weekes, J. R. (2002). *Assessment and treatment of forensic clinical populations.* Invited paper presented at the 10th British Prison Drug Workers' Conference, Manchester, England.

Weekes, J. R., Millson, W. A., Porporino, F. J., & Robinson, D. (1994). *The offender substance abuse pre-release problem: Intermediate and post-release outcomes*. Ottawa: Research and Statistics Branch, Correctional Service of Canada.

Weekes, J. R., Moser, A. E., & Langevin, C. M. (1999). Assessing substance-abusing offenders for treatment. In E. J. Latessa (Ed.) *Strategic solutions: The International Community Correction Association examines substance abuse*. Lanham, MD: American Correctional Association Press.

Welte, J. W., Zhang, L., & Wieczorek, W. F. (2001). The effects of substance use on specific types of criminal offending in young men. *Journal of Research in Crime and Delinquency, 38*(4), 416-438. doi:10.1177/0022427801038004004

Wexler, H. K., Melnick, G., & Cao, Y. (2009). Risk and prison substance abuse treatment outcomes: A replication and challenge. *The Prison Journal, 84*(1), 106-120. doi:10.1177/0032885503262458

Wilson, A. B., Draine, J., Hadley, T., Metraux, S., & Evans, A. (2011). Examining the impact of mental illness and substance use on recidivism in a county jail. *International Journal of Law and Psychiatry, 34*, 264-268. doi:10.1016/j.ijlp.2011.07.004

Wilson, L., Rooney, T., Baugh, R. F., & Millington, B. (2012). Recognition and management of perioperative serotonin syndrome. *American Journal of Otolaryngology*. doi:10.1016/j.amjoto.2011.10.002

Wise, E. A., Streiner, D. L., & Walfish, S. (2010). A review and comparison of the reliabilities of the MMPI-2, MCMI-III, and PAI presented in their respective test manuals. *Measurement and Evaluation in Counseling and Development, 42*(4), 246-254. doi:10.1177/0748175609354594

Woicik, P. A., Stewart, S. H., Pihl, R. O., & Conrod, P. J. (2009). The Substance Use Risk Profile scale: A scale measuring traits linked to reinforcement-specific substance use profiles. *Journal of Addictive Behaviours, 34*, 1042-1055. doi:10.1016/j.addbeh.2009.07.001

Wolf, M. E., Sun, X., Mangiavacchi, S., & Chao, S. Z. (2004). Psychomotor stimulants and neuronal plasticity. *Neuropharmacology, 47*(1), 61-79. doi:10.1016/j.neuropharm.2004.07.006

Wong, S. C., Gordon, A., & Gu, D. (2007). Assessment and treatment of violence-prone forensic clients: An integrated approach. *British Journal of Psychiatry, 190*, s66-s74. doi:10.1192/bjp.190.5.s66

Worling, J. R. (2001). Personality-based typology of adolescent male sexual offenders: Differences in recidivism rates, victim-selection characteristics, and personal victimization histories. *Sexual Abuse: A Journal of Research and Treatment, 13*, 149-166. doi:10.1177/107906320101300301

Yang, Y., & Raine, A. (2009). Prefrontal structure and functional brain imaging findings in antisocial, violent, and psychopathic individuals: A meta-analysis. *Psychiatry Research: Neuroimaging, 174*(2), 81-88. doi:10.1016/j.psychresns.2009.03.012

Zanarini, M. C.,Frankenbur, F. R., Weingeroff, J. L., Reich, D. B., Fitzmaurice, G. M., & Weiss, R. D. (2011). The course of substance use disorders in patients with borderline personality disorder and Axis II comparison subjects: A 10-year follow-up study. *Addiction, 106*(2), 342-358. doi:10.1111/j.1360-0443.2010.03176.x

Zancy, J. P., Janiszewski, D., Sadeghi, P., & Black, M. L. (1999). Reinforcing, subjective, and psychomotor effects of sevoflurane and nitrous oxide in moderate-drinking healthy volunteers. *Addiction, 94*(12), 1817-1828. doi:10.1046/j.1360-0443.199.94.1218177.x

Zancy, J. P., & Lichtor, S. A. (2008). Nonmedical use of prescription opioids: Motive and ubiquity issues. *The Journal of Pain, 9*(6), 473-486. doi:10.1016/j.jpain.2007.12.008

Zuckerman, M. (2007). Sensation seeking and crime, antisocial behaviour, and delinquency. In I. B. Weiner & W. E. Craighead (Eds.), *Corsini Encyclopedia of*

Psychology (4th ed.) (pp. 169-201). Washington, DC, USA: American Psychological Association.

Appendix A

General Demographics Questionnaire

Demographics Questionnaire
General Information

1. Age (in years): ____

2. To which ethnic group do you most identify yourself as belonging to?
   () African-Canadian / African Origin / Caribbean Origin
   () Asian-Canadian / Asian Origin
   () Latino(a) / Hispanic
   () First Nations / Inuit / Métis
   () European Origin / Caucasian
   () Middle Eastern
   () Bi-Racial / Multi-Racial
   () Other (please specify):_____

3. What is the highest level of education that you have **completed**?
   () Elementary school (Grades 1-5)
   () Middle School (Grades 6-8)
   () High School (Grades 9-12)
   () Some Community College
   () Community College
   () Some University
   () University (undergraduate degree)
   () Post-Graduate Studies (MA or PH.D.)

4. What is your current marital status?
   () Single (never married)
   () Common Law
   () Married
   () Separated/Divorced
   () Widowed

5. Please list all currently prescribed medications:

_____

_____

_____

_____

Appendix B

Criminal History Questionnaire

Criminal History

1. How old were you when you were *first* arrested (in years)? _____

2. How many times have you been incarcerated in total? _____

3. How many times have you been incarcerated for an alcohol or drug-related crime? __

4. How many months/years have you served on your present sentence? _____

5. During this sentence, how many times have you used substances (alcohol, drugs) while incarcerated? _____

6. For what are convictions are you *currently* serving custodial time? (**Select all that apply**)

() Murder/attempted murder/manslaughter
() Assault/aggravated assault
() Kidnapping/unlawful confinement/forcible seizure
() Arson
() Criminal negligence (driving while intoxicated, hit & run, dangerous driving)
() Breach of probation/failing to appear/jumping bail/unlawfully at large
() Obstruction of justice/perjury/assaulting a police officer
() Drug-related offence (selling, possession, producing, etc.)
() Fraud/forgery
() Mischief/vandalism/causing a disturbance
() Sex-related offence (sexual assault, sexual interference, indecent acts, accessing/making/distribution of child pornography, etc.)
() Theft-related offence (theft, robbery, breaking and entering, fraud, etc.)
() Weapons offence (possession, selling, dangerous use, etc.)
() Other (please specify): _____

7. Please check **all** offences you have **ever** committed (*including as a youth*):

() Murder/attempted murder/manslaughter
() Assault/aggravated assault
() Kidnapping/unlawful confinement/forcible seizure
() Arson
() Criminal negligence (driving while intoxicated, hit & run, dangerous driving)
() Breach of probation/failing to appear/jumping bail/unlawfully at large
() Obstruction of justice/perjury/assaulting a police officer
() Drug-related offence (selling, possession, producing, etc.)
() Fraud/forgery
() Mischief/vandalism/causing a disturbance
() Sex-related offence (sexual assault, sexual interference, indecent acts, accessing/making/distribution of child pornography, etc.)
() Theft-related offence (theft, robbery, breaking and entering, etc.)
() Weapons offence (possession, trafficking, dangerous use, etc.)
() Other (please specify): _____

Appendix C

Substance Use Disorder Diagnostic Schedule Questionnaire

Substance Use History

1. Which drug (including alcohol) do you **most** prefer? _____

2. Overall, how would you rate the lifetime severity of your problems caused by alcohol and/or drugs?
Circle one:

1	2	3	4	5	6	7	8	9
None				Moderate				Severe

For each of the highlighted sections, please answer the questions if you have ever used a substance belonging to the category (e.g., alcohol). If you have not used a substance in the category, leave that section blank and go to the next category

---

ALCOHOL
(e.g., beer, wine, distilled liquor, etc.)

---

1. How old were you when you first drank alcohol? _____

2. How old were you when you *first* consumed enough alcohol to get drunk? _____

3. On what date did you last drink (dd/mm/yyyy)? _____

4. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

5. How would you rate the severity of your problems caused by alcohol prior to incarceration? (Circle one):

1	2	3	4	5	6	7	8	9
None				Moderate				Severe
(No consequences)						(Legal, Social, Work consequences)		

Please respond to the next questions concerning your alcohol use IN THE YEAR PRIOR to your current period of incarceration

6. Have you ever had a period of excessive drinking OR had any evidence of alcohol-related problems? **YES NO**

7. Did you ever miss work or school because you were intoxicated or were very hung over? **YES NO**

8a. Did you ever do a poor job at work or school because you were intoxicated, or were very hung over? **YES NO**

8b. If yes, how many times? _____

9. Did you ever drink in a situation in which it might have been dangerous to drink at all? **YES NO**

10a. Did you ever drive while you were really too drunk to drive?

YES NO

10b. If yes, how many times? _____

11. Did your drinking ever get you into trouble with the law?

YES NO

12. Did your drinking cause problems with other people, such as with your family members, friends, or people at work?

YES NO

13a. Have you ever gotten into physical fights when drinking?

YES NO

13b. If yes, did you keep drinking anyway?

YES NO

14a. Have you ever gotten into bad arguments when drinking?

YES NO

14b. If yes, did you keep drinking anyway?

YES NO

15. Have you often found that when you started drinking you ended up drinking more than you were planning to drink?

YES NO

16a. Have you ever tried to cut down or stop drinking alcohol?

YES NO

16b. If yes, how many times? _____

17. Have you spent a lot of time drinking, being intoxicated, or hung over?

YES NO

18. Have you had times when you would drink so often that you started to drink instead of working, spending time with your family or friends, or engaging in other important activities, such as sports or playing music?

YES NO

19a. Has your drinking ever caused you psychological problems such as making you depressed or anxious, making it hard to sleep, or causing "blackouts?"

YES NO

19b. If yes, did you keep drinking anyways?

YES NO

20a. Has your drinking ever caused significant physical problems or made a physical problem worse? **YES NO**

20b. If yes, did you keep drinking anyway?

YES NO

21. Have you found the need to drink a lot more in order to get the feeling you wanted compared to when you first started drinking?

YES NO

22. Have you ever had any of the following withdrawal symptoms when you tried to cut down or stopped drinking?

Sweating or racing heart?	**YES**	**NO**	Feeling nauseated or vomiting?	**YES**	**NO**
Handshakes?	**YES**	**NO**	Feeling agitated?	**YES**	**NO**
Trouble sleeping?	**YES**	**NO**	Feeling anxious?	**YES**	**NO**

23. Did you ever have a seizure or see, feel, or hear things that were not really there when you cut down or stopped drinking?

YES NO

24. Did you ever start the day with a drink, or did you often drink or take some other drug or medication to keep yourself from getting the shakes or becoming sick?

YES NO

_

NARCOTICS

(e.g., methadone (only if NOT prescribed), morphine, dilaudid, codeine (Tylenol 3 & 4), heroin, percocets, oxycontin, demerol, vicodin, fentanyl)

---

1. How old were you when you first used a narcotic? _____

2. On what date did you last use a narcotic **other than prescribed methadone?** (dd/mm/yyyy) _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by narcotics prior to incarceration? (Circle one):

1	2	3	4	5	6	7	8	9
None				Moderate				Severe
(No consequences)								(Legal, Social, Work consequences)

Please respond to the next questions concerning your narcotics use IN THE YEAR PRIOR to your current period of incarceration

5. Have you ever had a period of excessive use of narcotics OR had any evidence of problems specifically relating to narcotics?

YES NO

6. Did you ever miss work or school because you were intoxicated, high or were very hung over due to narcotics?

YES NO

7a. Due to narcotics, did you ever do a poor job at work or school because you were intoxicated, high, or were very hung over?

YES NO

7b. If yes, how many times? _____

8. Did you ever use narcotics in a situation in which it might have been dangerous to use? **YES NO**

9a. Did you ever drive while you were really too stoned off a narcotic to drive?

YES NO

9b. If yes, how many times? _____

10. Did the use of narcotics ever get you into trouble with the law?

YES NO

11. Did narcotics use cause problems with other people, such as with your family members, friends, or people at work?

YES NO

12a. Have you ever gotten into physical fights when using narcotics?

YES NO

12b. If yes, did you keep using anyway?

YES NO

13a. Have you ever gotten into bad arguments when using narcotics?

YES NO

13b. If yes, did you keep using anyway?

YES NO

14. Have you often found that when you started using a narcotic you ended up using more than you were planning to?

YES NO

15a. Have you ever tried to cut down or stop using narcotics?

YES NO

15b. If yes, how many times? _____

16. Have you spent a lot of time using narcotics, or being high or hung over?

YES NO

17. Have you had times when you would use narcotics so often that you started to use it instead of working, spending time with your family or friends, or engaging in other important activities, such as sports or playing music?

YES NO

18a. Has your use of narcotics ever caused you psychological problems such as making you depressed or anxious, making it hard to sleep, or causing "blackouts?"

YES NO

18b. If yes, did you keep using it anyways?

YES NO

19a. Has your use of narcotics ever caused significant physical problems or made a physical problem worse?

YES NO

19b. If yes, did you keep using anyway?

YES NO

20. Have you found the need to use narcotics a lot more in order to get the feeling you wanted compared to when you first started using it?

YES NO

21. Have you ever had any of the following withdrawal symptoms when you tried to cut down or stopped using narcotics?

Sweating or racing heart?	**YES**	**NO**	Feeling nauseated or vomiting?	**YES**	**NO**
Handshakes?	**YES**	**NO**	Feeling agitated?	**YES**	**NO**
Trouble sleeping?	**YES**	**NO**	Feeling anxious?	**YES**	**NO**

22. Did you ever have a seizure or see, feel, or hear things that were not really there when you cut down or stopped using narcotics?

YES NO

23. Did you ever start the day with a narcotic, or did you often use or take some other drug or medication to keep yourself from getting the shakes or becoming sick?

YES NO

SEDATIVES

(e.g., tranquilizers (valium, ativan, rohypnol, etc.), barbiturates (phenobarbital, etc.), methaqualone (quaalude), GBH (G, liquid X), chloral hydrate (somnos))

---

1. How old were you when you first used a sedative? _____

2. On what date did you last use a sedative (dd/mm/yyyy)? _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by sedatives prior to incarceration?
Circle one:

1 2 3 4 5 6 7 8 9
None Moderate Severe
(No consequences) (Legal, Social, Work consequences)

Please respond to the next questions concerning your sedatives use IN THE YEAR PRIOR to your current period of incarceration

5. Have you ever had a period of excessive use of sedatives OR had any evidence of problems specifically relating to sedatives?
YES NO

6. Did you ever miss work or school because you were intoxicated, high or were very hung over due to sedatives?
YES NO

7a. Due to sedatives, did you ever do a poor job at work or school because you were intoxicated, high, or were very hung over?
YES NO
7b. If yes, how many times? _____

8. Did you ever use sedatives in a situation in which it might have been dangerous to use? **YES NO**

9a. Did you ever drive while you were really too stoned off of a sedative to drive?
YES NO
9b. If yes, how many times? _____

10. Did the use of sedatives ever get you into trouble with the law?
YES NO

11. Did sedatives use cause problems with other people, such as with your family members, friends, or people at work?
YES NO

12a. Have you ever gotten into physical fights when using sedatives?
YES NO
12b. If yes, did you keep using anyway?
YES NO

13a. Have you ever gotten into bad arguments when using sedatives?
YES NO
13b. If yes, did you keep using anyway?
YES NO
14. Have you often found that when you started using a sedative you ended up using more than you were planning to?
YES NO

15a. Have you ever tried to cut down or stop using sedatives?
YES NO
15b. If yes, how many times? _____

16. Have you spent a lot of time using sedatives, or being high or hung over?
YES NO

17. Have you had times when you would use sedatives so often that you started to use it instead of working, spending time with your family or friends, or engaging in other important activities, such as sports or playing music?
YES NO

18a. Has your use of sedatives ever caused you psychological problems such as making you depressed or anxious, making it hard to sleep, or causing "blackouts?"
YES NO
18b. If yes, did you keep using sedatives anyways?
YES NO

19a. Has your use of sedatives ever caused significant physical problems or made a physical problem worse?
YES NO
19b. If yes, did you keep using anyway?
YES NO

20. Have you found the need to use sedatives a lot more in order to get the feeling you wanted compared to when you first started using it?

YES NO

21. Have you ever had any of the following withdrawal symptoms when you tried to cut down or stopped using sedatives?

Sweating or racing heart?	**YES**	**NO**	Feeling nauseated or vomiting?	**YES**	**NO**
Handshakes?	**YES**	**NO**	Feeling agitated?	**YES**	**NO**
Trouble sleeping?	**YES**	**NO**	Feeling anxious?	**YES**	**NO**

22. Did you ever have a seizure or see, feel, or hear things that were not really there when you cut down or stopped using sedatives?

YES NO

23. Did you ever start the day with a sedative, or did you often use or take some other drug or medication to keep yourself from getting the shakes or becoming sick?

YES NO

–

STIMULANTS

(e.g., cocaine (freebase, crack, coke), amphetamines (speed), phenmetrazine (preludin), methamphetamine (crystal meth), Ritalin, Adderall, Dexedrine)

---

1. How old were you when you first used a stimulant? _____

2. On what date did you last use a stimulant (dd/mm/yyyy)? _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by stimulants prior to incarceration?

Circle one:

1	2	3	4	5	6	7	8	9
None				Moderate				Severe
(No consequences)								(Legal, Social, Work consequences)

Please respond to the next questions concerning your stimulant use IN THE YEAR PRIOR to your current period of incarceration

5. Have you ever had a period of excessive use of stimulants OR had any evidence of problems specifically relating to stimulants?

YES NO

6. Did you ever miss work or school because you were intoxicated, high or were very hung over due to stimulants?

YES NO

7a. Due to stimulants, did you ever do a poor job at work or school because you were intoxicated, high, or were very hung over?

YES NO

7b. If yes, how many times? _____

8. Did you ever use stimulants in a situation in which it might have been dangerous to use? **YES NO**

9a. Did you ever drive while you were really too stoned off of a stimulant to drive?

YES NO

9b. If yes, how many times? _____

10. Did the use of stimulants ever get you into trouble with the law?

YES NO

11. Did stimulants use cause problems with other people, such as with your family members, friends, or people at work?

YES NO

12a. Have you ever gotten into physical fights when using stimulants?

YES NO

12b. If yes, did you keep using anyway?

YES NO

13a. Have you ever gotten into bad arguments when using stimulants?

YES NO

13b. If yes, did you keep using anyway?

YES NO

14. Have you often found that when you started using a stimulant you ended up using more than you were planning to?

YES NO

15a. Have you ever tried to cut down or stop using stimulants?

YES NO

15b. If yes, how many times? _____

16. Have you spent a lot of time using stimulants, or being high or hung over?

YES NO

17. Have you had times when you would use stimulants so often that you started to use it instead of working, spending time with your family or friends, or engaging in other important activities, such as sports or playing music?

YES NO

18a. Has your use of stimulants ever caused you psychological problems such as making you depressed or anxious, making it hard to sleep, or causing "blackouts?"

YES NO

18b. If yes, did you keep using stimulants anyways?

YES NO

19a. Has your use of stimulants ever caused significant physical problems or made a physical problem worse?

YES NO

19b. If yes, did you keep using anyway?

YES NO

20. Have you found the need to use stimulants a lot more in order to get the feeling you wanted compared to when you first started using it?

YES NO

21. Have you ever had any of the following withdrawal symptoms when you tried to cut down or stopped using stimulants?

Sweating or racing heart? **YES NO** Feeling nauseated or vomiting? **YES NO**

Handshakes? **YES NO** Feeling agitated? **YES NO**

Trouble sleeping? **YES NO** Feeling anxious? **YES NO**

22. Did you ever have a seizure or see, feel, or hear things that were not really there when you cut down or stopped using stimulants?

YES NO

23. Did you ever start the day with a stimulant, or did you often use or take some other drug or medication to keep yourself from getting the shakes or becoming sick?

YES NO

_

CANNABIS

(e.g., marijuana (weed, pot), hashish, hash oil)

---

1. How old were you when you first used cannabis? _____

2. On what date did you last use cannabis (dd/mm/yyyy)? _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by cannabis prior to incarceration?

Circle one:

1 2 3 4 5 6 7 8 9

None Moderate Severe

(No consequences) (Legal, Social, Work consequences)

_

HALLUCINOGENS

(e.g., LSD (acid), mescaline (peyote), MDMA (ecstasy, X), ketamine (K, vitamin K), psilocybin (mush, shrooms, magic mushrooms), PCP (angel dust))

---

1. How old were you when you first used a hallucinogen? _____

2. What date did you last use a hallucinogen (dd/mm/yyyy)? _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by hallucinogens prior to incarceration?

Circle one:

1 2 3 4 5 6 7 8 9

None Moderate Severe

(No consequences) (Legal, Social, Work consequences)

_

INHALANTS

(e.g., glue, lighter fluid, paint/paint thinner, aerosols, gasoline)

---

1. How old were you when you first used an inhalant? _____

2. What date did you last use an inhalant (dd/mm/yyyy)? _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by inhalants prior to incarceration?

Circle one:

1 2 3 4 5 6 7 8 9

None Moderate Severe

(No consequences) (Legal, Social, Work consequences)

_

TOBACCO

(e.g., nicotine (cigarettes, cigars))

---

1. How old were you when you first used tobacco? _____

2. What date did you last use tobacco (dd/mm/yyyy)? _____

3. Frequency of use in the year prior to incarceration (Circle one):

Daily Weekly Bi-weekly Monthly Less than monthly

4. How would you rate the severity of your problems caused by tobacco prior to incarceration?

Circle one:

1 2 3 4 5 6 7 8 9

None Moderate Severe

(No consequences) (Legal, Social, Work consequences)

Appendix D

Substance Use Risk Profile Scale

Please carefully read the statements below and rate to what degree each statement applies to you. Rate each statement by circling the appropriate number.

		Strongly Disagree	Disagree	Agree	Strongly Agree
1	I am content.	1	2	3	4
2	I often don't think things through before I speak.	1	2	3	4
3	I would like to skydive.	1	2	3	4
4	I am happy.	1	2	3	4
5	I often involve myself in situations that I later regret being involved in.	1	2	3	4
6	I enjoy new and exciting experiences even if they are unconventional.	1	2	3	4
7	I have faith that my future holds great promise.	1	2	3	4
8	It's frightening to feel dizzy or faint.	1	2	3	4
9	I like doing things that frighten me a little.	1	2	3	4
10	It frightens me when I feel my heart beat change.	1	2	3	4
11	I usually act without stopping to think.	1	2	3	4
12	I would like to learn how to drive a motorcycle.	1	2	3	4
13	I feel proud of my accomplishments.	1	2	3	4
14	I get scared when I'm too nervous.	1	2	3	4
15	Generally, I am an impulsive person.	1	2	3	4
16	I am interested in experience for its own sake even if it is illegal.	1	2	3	4
17	I feel that I'm a failure.	1	2	3	4
18	I get scared when I experience unusual body sensations.	1	2	3	4
19	I would enjoy hiking long distances in wild and uninhabited territory.	1	2	3	4
20	I feel pleasant.	1	2	3	4

21	It scares me when I'm unable to focus on a task.	1	2	3	4
22	I feel I have to be manipulative to get what I want.	1	2	3	4
23	I am very enthusiastic about my future.	1	2	3	4

Appendix E

Modified Drinking Motives Questionnaire Revised

MDMQ-R

INSTRUCTIONS: Listed below are 23 reasons people may drink alcoholic beverages or use drugs. Using the five-point scale below, decide how frequently your own drinking or drug use is motivated by each of the reasons listed by checking the appropriate box.

	I USE MY PREFERRED SUBSTANCE…	Almost Never/ Never	Some of the time	Half of the time	Most of the time	Almost Always / Always
1.	As a way to celebrate	☐	☐	☐	☐	☐
2.	To relax	☐	☐	☐	☐	☐
3.	Because I like the feeling	☐	☐	☐	☐	☐
4.	Because it is what most of my friends do when we get together	☐	☐	☐	☐	☐
5.	To forget my worries	☐	☐	☐	☐	☐
6.	Because it is exciting	☐	☐	☐	☐	☐
7.	To be sociable	☐	☐	☐	☐	☐
8.	Because I feel more self-confident and sure of myself	☐	☐	☐	☐	☐
9.	To get a high	☐	☐	☐	☐	☐
10.	Because it is customary on special occasions	☐	☐	☐	☐	☐
11.	Because it helps me when I am feeling nervous	☐	☐	☐	☐	☐
12.	Because it's fun	☐	☐	☐	☐	☐
13.	Because it makes a social gathering more enjoyable	☐	☐	☐	☐	☐
14.	To cheer me up when I'm in a bad mood	☐	☐	☐	☐	☐
15.	To numb my pain	☐	☐	☐	☐	☐
16.	Because it helps me when I am feeling depressed	☐	☐	☐	☐	☐
17.	To reduce my anxiety	☐	☐	☐	☐	☐
18.	To stop me from dwelling on things	☐	☐	☐	☐	☐
19.	To turn off negative thoughts about myself	☐	☐	☐	☐	☐

	I USE MY PREFERRED SUBSTANCE…	Almost Never/ Never	Some of the time	Half of the time	Most of the time	Almost Always / Always
21.	To stop me from feeling so hopeless about the future	☐	☐	☐	☐	☐
22.	To forget painful memories	☐	☐	☐	☐	☐
23.	Because it makes me feel good	☐	☐	☐	☐	☐

Appendix F

Millon Clinical Multiaxial Inventory - III

The Millon Clinical Multiaxial Inventory - III is a copyrighted instrument that can be purchased through Pearson Education Inc. The copyright prohibits the reproduction, in full or in part, of the measure.

Appendix G

Levenson Self-Report Psychopathy Scale

LSRP

The test consists of twenty five statements that could possibly apply to you. You must rate each on how much you agree with it by circling the number that best represents your answer.

		Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
1	Success is based on survival of the fittest; I am not concerned about the losers	1	2	3	4
2	I quickly lose interest in the tasks I start	1	2	3	4
3	When I get frustrated, I often "let off steam" by blowing my top	1	2	3	4
4	My main purpose in life is getting as many goodies as I can	1	2	3	4
5	Before I do anything, I carefully consider the possible consequences	1	2	3	4
6	Making a lot of money is my most important goal	1	2	3	4
7	For me, what's right is whatever I can get away with	1	2	3	4
8	I am often bored	1	2	3	4
9	I enjoy manipulating other people's feelings	1	2	3	4
10	I often admire a really clever scam	1	2	3	4
11	I would be upset if my success came at someone else's expense	1	2	3	4
12	People who are stupid enough to get ripped off usually deserve it	1	2	3	4
13	I tell other people what they want to hear so that they will do what I want them to do	1	2	3	4
14	I feel bad if my words or actions cause someone else to feel emotional pain	1	2	3	4

		Disagree Strongly	Disagree Somewhat	Agree Somewhat	Agree Strongly
15	Looking out for myself is my top priority	1	2	3	4
16	Most of my problems are due to the fact that other people just don't understand me	1	2	3	4
17	Cheat is not justified because it is unfair to others	1	2	3	4
18	I find myself in the same kinds of trouble, time after time	1	2	3	4
19	Even if I were trying to sell something, I wouldn't lie about it	1	2	3	4
20	In today's world, I feel justified in doing anything I can get away with to succeed	1	2	3	4
21	I don't plan anything very far in advance	1	2	3	4
22	I let others worry about higher values, my main concern is with the bottom line	1	2	3	4
23	I find that I am able to pursue one goal for a long time	1	2	3	4
24	I make a point of trying not to hurt others in pursuit of my goals	1	2	3	4
25	I have been in a lot of shouting matches with other people	1	2	3	4

Appendix H

Timeline Followback Instructions and Calendar

Instructions for Filling Out the Timeline Substance Use Calendar

To help us evaluate your drinking and drug use, we need to get an idea of what your substance use and behaviour was like in the past _90_ days (i.e., 3 months). To do this, we would like you to fill out the attached calendar.

- ✓ Filling out the calendar is not hard!
- ✓ Try to be as accurate as possible.
- ✓ We recognize you won't have perfect recall. That's OKAY.

✓ WHAT TO FILL IN

- The idea is to put the name of a substance and a number of how much you used/ consumed (e.g., 1 beer, 3g of cocaine, 3 joints, 6 pills in total) in for **each day** on the calendar
- On days when you did not drink or use, you should write a "0".
- On days when you did drink or use, you should write the names of the substances that you used and how much you used of each.
- We want you to record your drinking/substance use and institutional behaviour on the calendar

It's important that something is written for <u>every</u> day, even if it is a "0".

✓ YOUR BEST ESTIMATE

- We realize it isn't easy to recall things with 100% accuracy.
- If you are not sure whether you drank 7 or 11 drinks or whether you drank on a Thursday, **give it your best guess!** What is important is that 7 or 11 drinks is very different from 1 or 2 drinks or 25 drinks. The goal is to get a sense of how frequently you drank or used drugs, how much you drank or used, and your patterns of drinking and substance use.

✓ HELPFUL HINTS

- Holidays such as Thanksgiving and Christmas are marked on the calendar to help you better recall your drinking, substance use, and behaviour. Also, think about how much you drank/ used on personal events such as birthdays.
- If you have regular use patterns, you can use these to help you recall your drinking or drug use For example, you may have a daily or weekend/weekday pattern, or drink/use more closer to release, or
  you may drink/use on Wednesdays after playing sports in the yard.

✓ COMPLETING THE CALENDAR

- A blank calendar is attached. Write in the number of drinks that you had each day and the names and amounts of any drugs you used in the last three months as well. Also indicate the names and amounts of any institutional charges you were given over the last three months.
- The time period we are talking about on the calendar is **from _____ to _____.**
- In estimating, be as accurate as possible.

• **DOUBLE CHECK THAT <u>ALL</u> DAYS ARE FILLED IN BEFORE RETURNING THE CALENDAR.**

Before you start look at the **SAMPLE CALENDAR** on the next page.

Instructions for Filling Out the Timeline Substance Use Calendar

✓ SAMPLE CALENDAR

	SUN	MON	TUES	WED	THURS	FRI	SAT
						1 Alcohol 8 cups	2 0
S	3 Alcohol 7 shots	4 Labor Day 0	5 Cocaine 3g	6 Alcohol 8 mugs	7 Cocaine 1g	8 0	9 Alcohol 11 glasses
E	10 Alcohol 2 sips	11 Cigarettes 1	12 Joints 1	13 Valium 3 pills	14 Joints 1	15 Alcohol 14 mugs	16 LSD 4 tabs
P	17 Cocaine 2g	18 Joints 1 Cigarettes 1	19 0	20	21 0	22 Valium 2 pills	23 Alcohol 13 mugs
T	24 0	25 0	26 Alcohol 6 mugs	27	28 0	29 0	30 Cocaine 2g

Name/ID#: _____ Date: _____

TIMELINE FOLLOWBACK CALENDAR: 2012

Remember to fill out for each day, the type & amount of substance (e.g., alcohol 2 drinks, valium 1 pill) you've used in the last three months.

Complete the Following

Start Date (Day 1): _____ **End Date** (yesterday):_____

	SUN	MON	TUES	WED	THURS	FRI	SAT
	1 New Year's	2	3	4	5	6	7
J	8	9	10	11	12	13	14
A	15	16	17	18	19	20	21
N	22	23	24	25	26	27	28
	29	30	31	1	2 Groundhog Day	3	4
F	5	6	7	8	9	10	11
E	12	13	14 Valentine's Day	15	16	17	18
B	19	20	21	22	23	24 Yukon Heritage	25
	26	27	28	29	1	2	3
M	4	5	6	7	8	9	10
A	11 Daylight Savings	12	13	14	15	16	17
R	18	19 St. Patrick's Day	20	21	22	23	24
	25	26	27	28	29	30	31
A	1	2	3	4	5	6 Good Friday	7 Passover
P	8 Easter	9	10	11	12	13	14
R	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	1	2	3	4	5

M	6	7	8	9	10	11	12
A	13 Mother's Day	14	15	16	17	18	19
Y	20	21 Victoria Day	22	23	24	25	26
	27	28	29	30	31		

	SUN	**MON**	**TUES**	**WED**	**THURS**	**FRI**	**SAT**
						1	2
J	3	4	5	6	7	8	9
U	10	11	12	13	14	15	16
N	17 Father's Day	18	19	20	21 Aboriginal Day	22	23
	24 St. Jean Baptiste	25	26	27	28	29	30
J	1 Canada Day	2	3	4	5	6	7
U	8	9 Nunavut Day	10	11	12	13	14
L	15	16	17	18	19	20 Ramadan	21
	22	23	24	25	26	27	28
	29	30	31	1	2	3	4
A	5	6 Provincial Day	7	8	9	10	11
U	12	13	14	15	16	17	18
G	19	20	21	22	23	24	25
	26	27	28	29	30	31	1
S	2	3 Labor Day	4	5	6	7	8
E	9	10	11	12	13	14	15
P	16	17 Rosh Hashanah	18	19	20	21	22
	23	24	25	26	27	28	29
O	30	1	2	3	4	5	6
C	7	8 Thanksgiving	9	10	11	12	13
T	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31 Halloween	1	2	3

N	4	5	6	7	8	9	10
O	11 Remembrance	12	13	14	15 Muharram	16	17
V	18	19	20	21	22	23	24
	25	26	27	28	29	30	1
D	2	3	4	5	6	7	8
E	9 Hanukkah	10	11	12	13	14	15
C	16	17	18	19	20	21	22
	23	24 Christmas Eve	25 Christmas	26 Boxing Day	27	28	29
	30	31 New Year's Eve					

Name/ID#: _____ Date: _____

TIMELINE FOLLOWBACK CALENDAR: 2013

Remember to fill out for each day, the type and amount of substance (e.g., alcohol 3 drinks, valium 1 pill) you've used in the last three months.

Complete the Following

Start Date (Day 1): _____ **End Date** (yesterday):_____

	SUN	MON	TUES	WED	THURS	FRI	SAT
			1 New Year's Day	2	3	4	5
J	6	7	8	9	10	11	12
A	13	14	15	16	17	18	19
N	20	21	22	23	24	25	26
	27	28	29	30	31	1	2 Groundhog Day
F	3	4	5	6	7	8	9
E	10	11	12	13	14 Valentine's Day	15	16
B	17	18	19	20	21	22	23
	24 Yukon Heritage	25	26	27	28	1	2
M	3	4	5	6	7	8	9
A	10	11	12	13	14	15	16
R	17 St. Patrick's Day	18	19	20	21	22	23
	24	25	26	27	28	29 Good Friday	30 Passover

	31 Easter	1	2	3	4	5	6
A	7	8	9	10	11	12	13
P	14	15	16	17	18	19	20
R	21	22	23	24	25	26	27
	28	29	30	1	2	3	4
M	5	6	7	8	9	10	11
A	12 Mother's Day	13	14	15	16	17	18
Y	19	20 Victoria Day	21	22	23	24	25
	26	27	28	29	30	31	

	SUN	MON	TUES	WED	THURS	FRI	SAT
							1
J	2	3	4	5	6	7	8
U	9	10	11	12	13	14	15
N	16 Father's Day	17	18	19	20	21 Aboriginal Day	22
	23	24 St. Jean	25	26	27	28	29
	30	1 Canada Day	2	3	4	5	6
J	7	8	9 Nunavut Day	10	11	12	13
U	14	15	16	17	18	19 Ramadan	20
L	21	22	23	24	25	26	27
	28	29	30	31	1	2	3

A	4	5 Provincial Day	6	7	8	9	10
U	11	12	13	14	15	16	17
G	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
S	1	2 Labor Day	3	4	5	6	7
E	8	9	10	11	12	13	14
P	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	1	2	3	4	5
O	6	7	8	9	10	11	12
C	13	14 Thanksgiving	15	16	17	18	19
T	20	21	22	23	24	25	26
	27	28	29	30	31 Halloween	1	2
N	3	4	5 Election Day	6	7	8	9
O	10	11 Remembrance	12	13	14	15	16
V	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
D	1	2	3	4	5	6	7
E	8 Hanukkah	9	10	11	12	13	14
C	15	16	17	18	19	20	21

Appendix I

University of New Brunswick Research Ethics Board Approval

University of New Brunswick Saint John
PO Box 5050 Saint John, NB E2L 4L5

Research Ethics Board

UNIVERSITY OF NEW BRUNSWICK
PO BOX 4040 FREDERICTON, NB CANADA E2L 4L5
TEL 506 453 5189 FAX 506 453 3522 WWW.UNB.CA/RESEARCH
OFFICE OF THE PROVOST & VICE-PRESIDENT (RESEARCH)

January 23, 2013

Mr. Anthony Hopley
c/o: Dr. Caroline Brunelle
Department of Psychology
UNB - Saint John campus

Project Title: **A comprehensive typology of substance misusing offenders: Towards the understanding of offender diversity.**
REB File Number: **030-2012**
Date Application Received – **October 31st, 2012**
Date Approved – **January 21st, 2013**

Dear Mr. Hopley,

This is to inform you that the above-named protocol has been approved as submitted.

The period of approval is from January 23rd, 2013 to January 22nd, 2015.
Please inform me of any changes made to your protocol during the approval period.

And I remind you that the Board requires a brief description of the outcome of the project upon its completion.

Your application received delegated review. For your information I have included the names of the current members of the UNBSJ REB below.

Good luck with your research.

Sincerely,

Lisa Best

Dr. Lisa Best, Chair
Research Ethics Board,
UNB – Saint John Campus

UNBSJ REB Members: Lisa Best, Department of Psychology
Leslie Jeffrey, Department of History and Politics
Signe Gurholt, Community Representative
Sandee Hicks-Moore, Department of Nursing
Mostaq Hussain, Faculty of Business
David Levangie, Community Representative
Kathy McGuire, Department of Psychology
Aline Munro, NB Community College Representative
Rebecca Atkinson, Community Representative, Legal

Appendix J

New Brunswick Department of Public Safety Research Ethics Approval

This Agreement made this 26 day of February, 2013

BETWEEN:

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF NEW BRUNSWICK, as represented by the Department of Public Safety (hereinafter referred to as the "Department")

OF THE FIRST PART

-and-

University of New Brunswick
(hereinafter referred to as the 'Researcher')

OF THE SECOND PART

WHEREAS the Researcher desires to carry out a study described as *A Comprehensive Typology of Substance Misusing Offenders: Towards the Understanding of Offender Diversity* (hereinafter referred to as the "Project"). This evaluation will provide insight into the personality factors of offenders associated with substance misuse.

AND WHEREAS the Researcher desires to carry out the Project in the manner described in the Research Proposal in Schedule B subject to the terms and conditions of this agreement;

AND WHEREAS the Researcher requests the Department's assistance in circulating the advertisement for recruiting research subjects;

AND WHEREAS the Researcher has obtained written approval from the Research Ethics Board at the University of New Brunswick – Saint John Campus;

NOW THEREFORE, in exchange for the mutual promises contained herein, the parties agree as follows:

1. **Definitions**

In this Agreement the following words shall have the following meanings:

'Agreement" means this Agreement entered into between the Department and the Researcher and all Schedules to this Agreement.

'Client Information System" (CIS) means the electronic operational information system used by the Department of Public Safety, Public Security and Corrections. This database contains information regarding offenders involved in the Criminal Justice System in New Brunswick.

"Personal Information" means information as defined in section 1 of the Right to Information and Protection of Privacy Act.

B.

"Authorized Persons" means the person(s) listed in Schedule A.

"Schedules" means the following Schedules to this Agreement:

(a) Schedule A: Authorized Persons
(b) Schedule B: Research Proposal
(b) Schedule C: Copies of the Questionnaires/Survey Documents
(c) Schedule D: Research Participant Recruitment Advertisement
(d) Schedule E: Consent Form

2. **Representations and Warranties by Researcher**

(1) The Researcher represents and warrants that the research purpose cannot reasonably be accomplished unless the information from the participants is provided, written consent shall be provided by the research participants, and involvement in the study is not harmful to the participants.

(2) The Researcher and the Authorized Person(s) identified in Schedule A are subject to the terms and conditions of this agreement.

3. **The Department agrees to:**

(1) assist in the recruitment of research subjects by posting an advertisement (Schedule D) in four provincial correctional facilities, including:
   a. Madawaska Regional Correctional Centre;
   b. Saint John Regional Correctional Centre;
   c. Southeast Regional Correctional Centre; and
   d. Dalhousie Regional Correctional Centre

4. **Security and Confidentiality of Information**

(1) The Researcher agrees s/he shall:

(a) employ strategies to protect confidentiality and anonymity of research participants and data as indicated in the Project's proposal (Schedule B)

(b) only use information as provided by the research participants for which a signed consent form has been obtained;

(c) not use any 3rd party information that may be disclosed by the research participants;

(d) not access unauthorized information.

(2) Accessing unauthorized information by the Researcher will result in immediate termination of the Agreement.

5. **Responsibilities of the Researcher**

(1) The Researcher agrees to comply with any applicable provincial or federal

legislation, including but not limited to applicable provisions of the Right to Information and Protection of Privacy Act.

(2) The Researcher agrees that access will not be granted to the Client Information System (CIS) for the purpose of this Project.

(3) The Researcher agrees to complete interviews in a reasonable amount of time, as determined by the Department.

6. **Consent**

(1) The Researcher shall obtain informed written consent from participants prior to an individual's participation in the Project.

7. **Use of Information**

(1) The information provided to the Researcher pursuant to this Agreement shall be used solely for the purpose of the Project described in the Research Proposal in Schedule B.

(2) The Researcher shall ensure that Personal Information about a research participant is not used for an administrative purpose directly affecting the individual.

(3) The Researcher agrees that no information which identifies or could be used to identify an individual to whom it relates shall be transmitted by means of any telecommunication device, including telephone, fax or modem.

8. **Term**

This Agreement shall take effect on the signing of both parties and shall continue in force for an initial term of one year unless earlier terminated under section 10.

9. **Indemnity**

(1) The Researcher shall indemnify and hold the Department harmless from and against all costs, claims, damages, expenses or liabilities suffered, sustained, paid or incurred by the Department as a result of any breach of any covenant or agreement herein contained, any representation or warranty by the Researcher being incorrect or incomplete, or with respect to any claim by a third party against the Department for any loss, cost, damage or expense incurred as a result of any act or omission of the Department. Without limiting the foregoing, such indemnity shall include damages awarded in any action or proceeding together with the reasonable fees and expenses of legal counsel incurred in connection therewith.

(2) Such indemnification shall survive the termination of the Agreement.

10. **Termination**

(1) Despite section 8, either party may terminate this Agreement for any reason, by giving thirty (30) calendar days notice in writing by registered mail to the other

party.

11. **Survival of Obligations**

Articles 2, 4 and 7 and any other obligations of the Researcher under this Agreement which expressly or by their nature survive the termination or expiry of the Agreement will continue in force subsequent to, and in spite of, such termination or expiry until they are satisfied or by their nature expire.

12. **Report**

(1) The Researcher agrees to provide the Department with a draft report prior to any publication of the report; and

(2) The Researcher agrees that upon review of the draft report, if the Department is of the opinion that information obtained therein compromises the security of the Department, an institution, an individual or the public, the researcher shall edit the report prior to publication.

(3) In addition to the provision of a draft report, the researcher agrees to provide the Department with a copy of the final report prepared pursuant to this Agreement upon the completion of the report.

(4) The Researcher agrees that only non-identifiable information will be disclosed or published.

(5) When the processing of information yields tabulations or aggregate groups of less than five (5) or a number in which a possibility exists that an individual could be identified, the Researcher will not release or include in any publications or statistical reports such information.

(6) Where a graduate student is employed in the work, the graduate student will own the copyright to the thesis developed in conjunction with this project, subject to subsection 1 through 5 . The graduate student will not be delayed in any way by the requirements of this agreement in writing and presenting his or her thesis to meet the usual academic requirements for graduation.

13. **Entire Agreement**

This Agreement and included Schedules embodies the entire agreement of the parties and no understandings or agreement, verbal or otherwise, exists outside of this Agreement.

14. **Amending Procedures**

(1) This Agreement, including the Schedules attached hereto, may be amended from time to time and as necessary with the concurrence of both parties, provided however, that such amendment must be in writing and signed by both parties.

(2) Any amendment to this Agreement or extension in the term of this Agreement is subject to signed approval by both parties.

15. **Notices**

Any notices pursuant to this Agreement shall be deemed to have been received by the other party if the notice has been sent by registered mail or personally served at the address provided below (or such other address as is conveyed in writing during the term of this Agreement):

(a) Public Security and Corrections
Director of Correctional Services
Department of Public Safety
364 Argyle Street
Fredericton, New Brunswick E3B 1T9

(b) University of New Brunswick
Office of Research Services
Attention: Executive Director
3 Bailey Drive
P.O. Box 4400
Fredericton, NB E3B 5A3

With a copy to:

Caroline Brunelle, Ph.D., L. Psych.
Assistant Professor, University of New Brunswick-Saint John Campus
100 Tucker Park Drive
Saint John, New Brunswick E2L 4L5

16. **Severability**

If any provision of this Agreement is deemed to be illegal or invalid or contrary to the law, then that portion of this Agreement shall deem to have been severed from the remainder of this Agreement.

17. **Validity and Interpretation**

The validity and interpretation of this Agreement is to be governed by the laws in force in the Province of New Brunswick.

18. **Binding**

This Agreement is binding on the heirs, successors, and assigns of the parties hereto.

IN WITNESS WHEREOF the parties have executed this Agreement on the date first above written.

SIGNED AND DELIVERED

_____ _____

(Witness)

(Director of Correctional Services)

(Date)

SIGNED AND DELIVERED
In the presence of:

(Witness)

THE RESEARCHER:

F.D. Ball, P.Geo.
Executive Director
Office of Research Services, UNB

(Office of Research Services)

March 4, 2013
(Date)

Acknowledgment

I, the Principal Investigator, having read this Agreement, hereby agree to act in accordance with all the terms and conditions herein and further agree to ensure that all University of New Brunswick participants are informed of their obligations under such terms and conditions.

Dr. Caroline Brunelle

Appendix K

Correctional Services of Canada Research Ethics Approval

Correctional Service Canada / Service correctionnel Canada

PROTECTED A / PROTÉGÉ A — ONCE COMPLETED / UNE FOIS REMPLI

NOTE: Reference document = CD009

RESEARCH APPLICATION AND UNDERTAKING

DEMANDE DE RENSEIGNEMENTS À DES FINS DE RECHERCHE ET ENGAGEMENTS CORRÉLATIFS

PUT AWAY ON FILE – CLASSER AU DOSSIER
ADMINISTRATIVE OR OPERATIONAL FILE
DOSSIER ADMINISTRATIF OU OPÉRATIONNEL

▸ Original = Research Branch / Direction de la recherche

NOTE – See reverse for Terms and Conditions **NOTE – Voir les Modalités et conditions au verso**

Date submitted / Date déposée ▸ 2013/03/18 (YYYYAAAA/MM/DJ)

Research Project – Projet de recherche

Project Title – Titre du projet

A Comprehensive Typology of Substance Misusing Offenders: Towards the Understanding of Offender Diversity

Project Description – Description du projet

The goals of the study are: 1. to validate the SURP model in a correctional sample an determine if any adjustments to the model are required for this population; 2. to explore the ability of the SURP model to predict offender substance abuse while incarcerated; 3. to gain a better understanding of the relationship between substance use disorders and criminal behavior by examining the relationship between personality variables and behavioral indicators of substance misuse and antisocial behavior.

Type/Class of Information Requested – Type/catégorie des renseignements demandés

Primary Researcher – Chercheur principal

Name and title – Nom et titre	Operational unit – Unité opérationnel	Sector – Secteur	Region – Région
Anthony Hopley, Ph. D. Candidate	Department of Psychology, University of New Brunswick		Atlantic

Address – Adresse	Telephone number – N° de téléphone
P.O. Box 5050 Saint John, New Brunswick E2L 4L5	1-506-261-2111

Other Researchers – Autres chercheurs

1) Name and affiliation – Nom et affiliation	Telephone number – N° de téléphone
2) Name and affiliation – Nom et affiliation	Telephone number – N° de téléphone
3) Name and affiliation – Nom et affiliation	Telephone number – N° de téléphone

Approval – Approbation

Name of Primary Researcher Director (print) – Nom du Directeur du chercheur principal (lettres moulées)	Primary Researcher Director – Signature – Directeur du chercheur principal	Date (YYYYAAAA-MM-DJ)
Name of Director, Access to Information and Privacy (print) – Nom du Directeur de l'Accès à l'information et de la protection des renseignements personnels (lettres moulées)	Director, Access to Information and Privacy – Signature – Directeur de l'Accès à l'information et de la protection des renseignements personnels	Date (YYYYAAAA-MM-DJ)
Name of Director ~~General~~ Research (print) – Nom du Directeur ~~général~~ de la Recherche (lettres moulées) **Kelly Taylor**	Director ~~General~~ Research – Signature – Directeur ~~général~~ de la Recherche Kelly Taylor	Date (YYYYAAAA-MM-DJ) JUN 1 0 2013

CSC/SCC 0954 (R-2009-08) (Word – Version – Word) Page 1 of / de 2

TERMS AND CONDITIONS

Interpretation
The provision of data for research purposes is approved by the Director General of Research. All participants shall adhere to the terms and conditions of the Research Application and Undertaking Form. The Service has the right to examine any results or reports in order to verify that no personal information has been compromised. No further personal information will be provided to the participant(s) if this agreement is violated.

Non-disclosure of personal information
The researcher or organization
i) agrees that information contained in or resulting from the data provided shall be rendered anonymous (i.e. coded and stripped of personal identifiers) as soon as possible
ii) shall not contact the study's participant(s) unless specifically authorized to do so and, if authorized, shall guarantee that any additional information obtained from these individuals will receive the same level of confidentiality as maintained for the original data
iii) agrees that no subsequent disclosure of the information in a form that could reasonably be expected to identify the individual(s) to whom it relates will be made to any other person or third party not participating in the research project

Data location, consultation and disposal
For any data not secured within the physical confines of the Correctional Service of Canada, the participant(s) shall provide
i) a written statement specifying where the data or copies of records will be consulted or used
ii) a list of any data linkages that have been approved and an undertaking not to perform other matches without written authorization
iii) a written statement regarding the conditions governing disposal of identifiable personal data and, if desirable and applicable, the archival arrangements for working data and the relevant programs, codes and guides

Participant(s) acknowledgements
The participant(s)
i) recognizes that permission to conduct research may be withdrawn at any time for violations of standing orders, rules and regulations related to security or for unapproved deviations from the original proposal, or it may be temporarily suspended for operational reasons
ii) will abide by the standing orders and rules of the institution or parole office, including those designed to ensure the researcher's own safety
iii) acknowledges that, other than the report submitted for publication, no further release of data shall be made without the permission of the Service and/or the Department
iv) will make appropriated acknowledgement in all subsequent reports of the Correctional Service of Canada's sponsorship of the research, as well as an appropriate disclaimer that the opinions and conclusions do not necessarily represent those of the Service and/or Department
v) acknowledges that ownership of the data rests with the Correctional Service of Canada

Approval

It is agreed that all parties signing this agreement and any attachments thereto are satisfied with and will adhere to its terms and conditions.

MODALITÉS ET CONDITIONS

Interprétation
La collecte de données destinées à la recherche est approuvée par le directeur général de la Recherche. Les participants doivent se conformer aux modalités et conditions contenues dans le formulaire *Demande de renseignements à des fins de recherche et engagements corrélatifs*. Le Service se réserve le droit de vérifier les résultats et rapports dans le but de s'assurer qu'aucun renseignement personnel n'a été divulgué. Aucun autre renseignement personnel ne sera communiqué au(x) participant(s) si les modalités de la présente entente ne sont pas respectées.

Non-divulgation de renseignements personnels
Le chercheur ou l'organisme
I) s'engage à donner un caractère anonyme aux renseignements de la recherche (codés et dépourvus d'identifiants) le plus tôt possible
II) s'engage à ne pas entrer en contact avec le(s) participant(s) à moins d'en être autorisé et, dans ce cas, d'accorder aux renseignements recueillis le même degré de confidentialité qu'il a été accordé aux renseignements initiaux
III) s'engage à ne pas divulguer par la suite à un tiers ou à quiconque ne participe pas à la recherche, tout renseignement qui permettrait, même indirectement, d'identifier la (ou les) personne(s) visée(s)

Stockage, consultation et élimination des données
Dans le cas des données qui ne sont pas gardées en lieu sûr dans les locaux du Service correctionnel du Canada, le participant remettra
i) un document qui précise où seront consultées ou utilisées les données et copies de document
ii) une liste renfermant les couplages de données approuvés accompagnée d'un engagement formel de ne pas procéder à d'autres couplages sans autorisation écrite
iii) un document qui précise les conditions régissant l'élimination des renseignements personnels permettant d'identifier la (ou les) personne(s) visée(s) ainsi que, dans la mesure du possible, les procédés d'archive utilisés pour les données ainsi que les programmes, codes et guides connexes

Déclaration du participant
Le participant
i) reconnaît que le droit qui lui est accordé de participer aux travaux de recherche peut lui être retiré en tout temps en cas de non-respect des consignes, règles et règlements concernant la sécurité ou de démarches non conformes à l'esprit du projet tel qu'il fut présenté. Le droit de participation peut également être temporairement suspendu pour des raisons opérationnelles
ii) s'engage à respecter les consignes émises par l'établissement ou par le bureau de libération conditionnelle, y compris celles concernant sa propre sécurité
iii) s'engage à ne pas diffuser ou publier de données autres que celles déjà contenues dans le rapport officiel sur le projet, à moins d'y être autorisé par le SCC et/ou le Ministère
iv) s'engage à faire mention du parrainage accordé par le Service correctionnel du Canada lors de toute publication ultérieure touchant le projet et à y joindre une clause précisant que les opinions ou conclusions exprimées ne représentent pas nécessairement le point de vue du Service et/ou du Ministère
v) reconnaît que toutes les données du projet de recherche sont la propriété exclusive du Service correctionnel du Canada

Approbation

Les signataires du présent formulaire et des pièces qui peuvent y être jointes se déclarent en accord avec les modalités et les conditions que renferment ces documents et s'engagent à les respecter.

Appendix L

Recruitment Advertisement

Do you feel that your alcohol or drug use is problematic?

Come and help us to learn more about this and share a coffee and doughnut with us!

My name is Anthony Hopley. I am a doctorate student at the University of New Brunswick. I am conducting a study at your institution under the supervision of Dr. Caroline Brunelle and I am looking for participants.

DETAILS

- The purpose of this research project is to help explain why individuals engage in substance abuse and crime by examining some personality characteristics.

PROCEDURE

- Sign-up below if you are interested in participating and **you have been at this institution for three months, are aged between 19-49 years old, and can understand and speak English.**
- You will be asked to read and sign the consent form, after I describe the study and what you'll be asked to do.
- You will be asked to fill out a series of seven questionnaires concerning basic demographic information, criminal history, aspects of your personality and substance use.
- After this, you will be asked to fill out a calendar on which you report the type and quantity of any substances you've used in the last three months.
- Participation will take between 90-120 minutes in total.
- Your responses will be kept confidential from institutional employees and data will be examined for patterns across groups, not individually.



The University of New Brunswick - Saint John Campus Ethics Board and the Institution's research and ethics board have approved this research project.

Sign-Up Sheet

Session Date:_____

NAME *(Please Print)*	**NAME** *(Please Print)*
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

_____

Appendix M

Informed Consent Form

Consent Form to Participate in Research

A comprehensive typology of substance misusing offenders: Towards the understanding of offender diversity

INTRODUCTION:
You are invited to participate in the research project named above. In order for you to decide if you would like to participate in the project, you need to know the purpose of the study, the procedures involved, what would be expected of you, the risk and benefits, as well as your rights.

PURPOSE
I understand that the purpose of this research is to gain a better understanding of how characteristics linked to criminal offending and substance misuse are associated. Specifically, the investigators (members of the Addictive Disorders and Comorbidity Laboratory of the University of New Brunswick) will measure personality characteristics, substance use, and mental health symptoms in those aged 19-49 to see if different types of substance misusers emerge based on these variables. The findings may have implications for treatment effectiveness. Specifically, if different types of offenders exist, treatment may be matched to the specific risk factors and needs of each subgroup.

PROCEDURE
I understand that the study involves the following procedures: I will be asked to sign the consent form. If I agree to participate, then I will be asked to complete seven questionnaires on basic demographics (e.g., age, ethnicity), criminal history, substance use, reasons for substance use, mental health symptoms, and personality traits. Following this, you will be asked to fill out a calendar on which you will report on your substance use in the last three months. Participation will take between 90-120 minutes in total.

It is important that you be aware that:

1) You are free to discontinue your participation in the project at any time.
2) In order to participate you must be between the ages of 19-49, have been at this institution for the last three months and can understand English.
3) You may choose not to answer certain questions on the questionnaires if you are uncomfortable doing so.
4) If you decide to participate, the information you will provide is strictly confidential, no
   one will have access to the answers you write except the researcher's team. **Staff at the correctional centre will NOT see or be told about your individual responses.**

5) However, should you provide any information that indicates suicide risk, risk of violence towards others, or child abuse, this will be reported to an appropriate institutional staff member. We are NOT going to directly ask you for this information. **No other information provided by you will be shared with the institution**.
6) Participation in the study will **not** affect your sentence in any way.

CONFIDENTIALITY

Only the investigators will have access to the information that you will provide if you participate. Nobody else, including prison officials, will see your responses on the questionnaires. This information will be kept securely locked in a filing cabinet in the laboratory or office of the principal investigator. In order to protect your identity, the consent form will be separated from the completed questionnaires and a number will be assigned to your file. The data collected will be used to answer the research questions but will not be used for any other purposes. Results may be communicated at scientific conferences or journals but no individual data will be presented so that it not possible to identify you.

PARTICIPANT'S STATEMENT

I have read and understood the above information. I am aware that my participation is voluntary and that I am free to withdraw from the study at any time. I have had the opportunity to ask any questions and all of my questions have been answered. I hereby give my consent to be a participant in this study.

NAME (please print) _____

SIGNATURE _____

WITNESS SIGNATURE _____

DATE _____

This research has been approved by the Research and Ethics Board of the University of New Brunswick.

CURRICULUM VITAE

Candidate's Full Name:

Anthony Hopley

Universities Attended:

University of New Brunswick, Doctor of Philosophy, Clinical Psychology, 2014 (expected)

Concordia University, Bachelor of Arts, Honours in Psychology (Magna cum laude), 2008

Champlain College, Diploma of Collegial Studies (D.E.C.), Social Science, 2004

Publications:

Papers:

Hopley, A.A.B., Wagner, J., & Nicki, R. (in press). Making a living online: Problem gambling and workaholism in high earning online texas hold'em poker players. *Journal of Gambling Issues*.

Hopley, A.A.B., & Brunelle, C. (2012). Personality mediators of psychopathy and substance dependence in male offenders. *Addictive Behaviors*, *37*(8), 947-955. doi:10.1016/j.addbeh.2012.03.031

Hopley, A.A.B., Dempsey, K., & Nicki, R. (2012). Texas hold'em online poker: A further examination. *International Journal of Mental Health & Addiction*, 10(4), 563-572. doi:10.1007/s11469-011-9353-2

Hopley, A.A.B., Nicki, R.M. (2010). Predictive factors of excessive online poker playing. *Cyberpsychology, Behavior and Social Networking, 13(4)*, 379-385. doi:10.1089/cyber.2009.0223

Abstracts:

Brunelle, C, Hopley, A., & Persad, A. (2009). The role of personality and drinking motives in understanding binge drinking among university students. Abstract published in *Alcoholism: Clinical & Experimental Research, 33*(S1), p.178A.

Conference Presentations:

Invited Speaker:

American Psychology-Law Society Annual Conference, New Orleans, LA. (2014, March). A comprehensive typology of substance misusing offenders: Towards the understanding of offender diversity.

2nd International Conference and Exhibition on Addiction Research & Therapy. (2013, July). Making a living online: Texas hold'em poker and problem gambling.

Interdisciplinary Health Research Day, University of Moncton. (2013, March). Making a living online: Four years of texas hold'em online poker research & problem gambling.

John Howard Society, Correctional Services of Canada Citizens Advisory Committee, & Correctional Services of Canada. (2010, March). New Brunswick Communities Mental Health Strategies: Are We On The Right Track?

Posters:

Hopley, A.A.B., Dempsey, K., & Nicki, R.M. (2011). *Texas hold'em online poker: A further examination*. Poster session presented at the 25th Annual National Council on Program Gambling Convention, Boston, MA, U.S.A.

Hopley, A.A.B., & Brunelle, C. (2011). *Personality mediators of psychopathy and substance dependence in male offenders*. Poster session presented at the 72nd Annual Convention of the Canadian Psychological Association, Toronto, ON, Canada.

Brunelle, C. & Hopley, A. A. B. (2011). *Psychopathy, substance dependence and motives for drug use: A heterogeneous relationship*. Poster presented at the North American Correctional and Criminal Justice Psychology Conference, Toronto, Canada.

Hopley, A.A.B., & Nicki, R.M. (2010). *Predictive factors of excessive online poker playing*. Poster session presented at the 71st Annual Convention of the Canadian Psychological Association, Winnipeg, MB, Canada.

Hopley, A. A. B., Francis, K., & Dugas, M. J. (2009). *Implicit memory bias in generalized anxiety disorder: The role of stimulus relevance*. Poster session presented at the 70th Annual Convention of the Canadian Psychological Association, Montréal, QC, Canada.

Brunelle, C., Hopley, A.A.B., & Persad, A.V. (2009). *The role of personality and drinking motives in understanding binge drinking in university students*. Poster session presented at the 32nd Annual Research Society on Alcoholism Scientific Conference, San Diego, CA, U.S.A.

Hopley, A. A. B., Steele, C., & Penhune, V. B. (2007). *The effects of repetition and interference on motor skill learning*. Poster session presented at Concordia University's 1st Annual Undergraduate Research Day, Montréal, QC, Canada.