Personality and Motives in the Pathogenesis of Substance Abuse in Offenders

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Abstract

Problems relating to substance use are well documented among offenders, and risk factors for their pathological use are beginning to be explored. Both personality and motives have been implicated in substance abuse in the general population. However, few studies have focused on their relevance and interrelationships using correctional samples. This study examined the relationships between the personality dimensions incorporated in Tellegen's model of personality and the severity of substance dependence symptoms reported by offenders ($N = 98$). Their associations with offenders' motives for substance use were assessed as it was anticipated that such motives may provide an explanatory mechanism for the personality – substance abuse relationship. Results revealed several robust associations between personality and substance dependence. There was also evidence of some degree of specificity of these traits according to the type of substance being abused, and for motives to mediate these associations. The implications of these findings for offender programming are discussed.

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Personality and Motives in the Pathogenesis of Substance Abuse in Offenders

Introduction

It is well documented that the vast majority of offenders present with evidence of substance abuse problems, with several studies consistently reporting over half of recently incarcerated individuals to be diagnosed as having a substance abuse or dependence disorder (Bushnell & Bakker, 1997; Peters, Greenbaum, Edens, Carter, & Ortiz, 1998). In addition, Canadian national prevalence data indicate that at least 7 out of 10 offenders in the federal correctional system have engaged in problematic use of alcohol and other drugs during the one-year period prior to their incarceration (Correctional Service of Canada [CSC], 2001; Weekes, 2002). These findings are of great importance because individuals with substance abuse problems are at a substantially higher risk of re-offending upon release from prison or correctional facilities than is typically the case for offenders without such difficulties (Dowden & Brown, 2002). Due to the numerous alcohol- and drug-related diseases and accidents associated with substance abuse, such disorders also place a considerable strain on the healthcare system (Andrews & Bonta, 1998). Therefore, given the pervasive deleterious effects of substance abuse for the individual, the criminal justice system, and society at large, a growing body of research is being directed toward the identification of potential risk factors for the development and maintenance of substance use disorders (SUDs) so that early intervention strategies can be implemented. Two factors that may be significant in this regard are personality pathology and an individual's motives for substance use.

Personality Pathology and Substance Abuse

The relative emphasis that has been placed on personality in the development of SUDs has a long history that has been fraught with controversy (Sutker & Allain, 1998). Early studies typically sought to identify an "addictive personality" characterized by a unique constellation of personality traits that rendered individuals with such characteristics vulnerable to developing an addiction (e.g., Gendreau & Gendreau, 1970; Rozin & Stoess, 1993). However, this proved to be a rather futile endeavour, with much of the research suggesting that those manifesting addictive disorders, such as substance abuse and dependence, are best conceptualized as a heterogeneous group of individuals with varying and multiple pathways leading to substance misuse (Chiauzzi & Liljegren, 1993; Pols, 1984; Verheul, 2001). Renewed interest in the role of personality in the pathogenesis of SUDs has largely been a result of the increased recognition of such heterogeneity. Support for its importance can be found across several lines of evidence, most notably those studies reporting high comorbidity between personality disorders and SUDs (Rounsaville, Kranzler, Ball, Tennen, Poling, & Triffleman, 1998; Verheul, Hartgers, van den Brink, & Koeter, 1998; Verheul, van den Brink, & Hartgers, 1995), cross-sectional investigations showing personality traits to be moderately correlated with indices of substance abuse (Chassin, Flora, & King, 2004; Iacono, Carlson, Taylor, Elkins, & McGue, 1999; Krueger, 1999; Loukas, Krull, Chassin, & Carle, 2000; Mulder, 2002; Ruiz, Pincus, & Dickinson, 2003; Sher, Bartholow, & Wood, 2000), and longitudinal studies revealing that personality early in life can predict the later onset of substance-related problems (Krueger, 1999).

A substantial portion of the research in the area of addictions and personality has typically examined the comorbidity of personality *disorders* and SUDs. Studies of this nature have shown that personality disorders, classified according to the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV; American Psychiatric Association, 1994), are common among substance abusing populations, particularly antisocial, borderline, paranoid, and avoidant personality disorders (Rounsaville et al., 1998; Verheul et al., 1998; Verheul et al., 1995). Moreover, personality disorders have been reported to be approximately four times more prevalent in individuals who abuse substances compared to those in the general population (Verheul, 2001).

Despite continued interest in personality disorders in individuals who misuse drugs and alcohol, over the past half century, there has been an attempt by several researchers to move away from the categorical approach to studying personality in which the mere presence or absence of a personality disorder is reported, in favour of a more dimensional approach which treats personality traits as continua (Clark, Livesley, & Morey, 1997; Widiger, 1992). Emerging from this research have been several influential approaches that have sought to specify both the number and nature of domains that adequately capture adult personality (e.g., Cloninger, 1987; Costa & McCrae, 1992; Eysenck, 1967; Tellegen, 1985). Although the underlying structure of personality or the dimensions proposed tends to vary across theoreticians, personality is viewed by most to reflect an individual's unique constellation of consistent behavioural traits (Weiten, 1998). Such a definition thus recognizes and explains both the consistency of a person's behaviour across situations, as well as the behavioural differences among individuals reacting to the same situation (i.e., distinctiveness). Initially, Eysenck (1967) proposed

that three dimensions underlie personality, namely neuroticism (i.e., the disposition to experience negative emotions), extraversion (i.e., sociability), and psychoticism (i.e., aggressiveness, antisociality, impulsiveness). Cloninger (1987) also suggested a three-factor model of personality with dimensions comparable to Eysenck, including harm avoidance (i.e., the tendency to be cautious or inhibited), reward dependence (i.e., ambitious, sympathetic), and novelty seeking (i.e., impulsive). In relating these dimensions to substance dependence and abuse, a number of studies have highlighted that individuals with SUDs are likely to score higher on measures assessing impulsivity, novelty seeking, neuroticism, and harm avoidance, while more mixed evidence exists for an association between substance abuse and reward dependence/extraversion (Chassin et al., 2004; Krueger, 1999; Mulder, 2002; Sher et al., 2000). With few exceptions (e.g., Sher et al., 2000), much of this research has focused exclusively on alcoholism and not drug abuse or dependence, suggesting that caution is warranted when interpreting these findings.

Another widely used model of adult personality is the five-factor model (FFM) developed by Costa and McCrae (1992). These authors propose that personality can be divided into five broad dimensions namely, neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Cross-sectional research applying the FFM to addictions has demonstrated that individuals with SUDs tend to have a profile characterized by high levels of neuroticism and low levels of conscientiousness (Ruiz et al., 2003; Sher et al., 2000), indicating that they tend to experience negative affect and anxiety (i.e., neurotic), as well as disorganized behaviour and impulse control deficits (i.e., low conscientiousness). While less consistent, some studies have also reported

individuals with SUDs to present with lower levels of agreeableness (i.e., a cynical, callous, antagonistic disposition) and elevated levels of extraversion (i.e., a sociable disposition with a tendency to experience positive emotions) (Flory, Lynam, Milich, Leukefeld, & Clayton, 2002). Differences across studies may largely be a result of the primary outcome measure of interest, such as whether substance use disorders, symptom severity, or consumption patterns were examined, and whether distinctions were made between the types of substances being abused.

Although the FFM is currently the dominant approach to studying adult personality, not all personality psychologists embrace the FFM and, on several occasions, many have convincingly argued that alternative models warrant further examination (e.g., Church, 1994; Tellegen, 1985). Another three-factor model of personality developed by Tellegen (1985) and embodied in the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982) is one such model. Indeed, this framework may hold the greatest promise for studying personality in the context of substance abuse as the three dimensions that it espouses map nicely onto the differential trajectories purported to lead to SUDs in contemporary pathway models (e.g., Verheul, 2001; Verheul & van den Brink, 2000). The three higher-order factors proposed by Tellegen's (1985) model include: positive emotionality (PEM), which is related to a tendency to experience positive emotions and to interact actively, efficaciously, and pleasurably with one's environment; negative emotionality (NEM), which represents a propensity toward negative mood states or distress; and constraint (CON), which encompasses tendencies toward behavioural restraint at the expense of impulsiveness and venturesomeness. A fourth scale labeled Absorption is not a primary indicator of any of Tellegen's higher-order dimensions, but

instead taps an individual's propensity for imaginative and self-involving experiences (Tellegen, 1992; Tellegen & Atkinson, 1974). Empirical comparisons between Tellegen's dimensions and alternative models of personality have revealed considerable overlap among the dimensions incorporated in each. Tellegen (1982), for example, found that PEM, NEM, and CON were related to Eysenck's Extraversion, Neuroticism, and Psychoticism (reversed) dimensions, respectively; while correlational analyses of the FFM and Tellegen's higher-order factors suggest that PEM is most strongly related to the Big Five Extraversion, CON to Conscientiousness, that NEM incorporates both Neuroticism and Agreeableness (inversely), and Absorption is most related to Openness to Experience (Church, 1994; Tellegen & Waller, 1994). Utilizing Tellegen's model, though PEM has yet to prove to be a robust predictor of SUDs (Conway, Swendsen, Rounsaville, & Merikangas, 2002; Kruger, 1999), the research literature is generally consistent in implicating higher levels of NEM and lower levels of CON in the development of SUDs both cross-sectionally (Iacono et al., 1999; Loukas et al., 2000; McGue, Slutske, & Iacono, 1999; Swendsen, Conway, Rounsaville, & Merikangas, 2002) and longitudinally (Krueger, 1999). These findings are consistent with several of the studies employing the alternate models above, which reported neuroticism and behavioural undercontrol (i.e., impulsivity, novelty seeking, conscientiousness) to be elevated in individuals with SUDs relative to those without such diagnoses (Chassin et al., 2004; Krueger, 1999; Ruiz et al., 2003; Sher et al., 2000). Unfortunately, despite the considerable evidence for an association between these personality traits and substance abuse, the degree of specificity to which the traits may be differentially linked to particular classes of substances (e.g., alcohol versus drugs) remains unclear. From the

few available studies that have explored such specificity, the findings have largely been inconsistent (e.g., Chassin et al., 2004; Conway et al., 2002; McGue et al., 1999), even though such inconsistency may be a result of the different measures used when assessing the above three higher-order factors. As well, but with one notable exception (see McGue et al., 1999), these studies have failed to control for alcohol abuse when assessing the relation between personality and drug abuse or vice versa, which may further contribute to the discrepant results.

Taken together, these findings suggest that personality may be a major etiological factor in the development of SUDs, and there is a growing body of literature endorsing the utility of Tellegen's three-factor model in furthering our understanding of which personality variables may be critical in this process. As there remains a dearth of research studying normal-range traits in offenders, it will be important to extend this line of research to such populations given their disproportionately high rates of substance abuse. In addition, there is substantial evidence that offenders exhibit many of the characteristics that are consistently linked to problematic substance use in the general population.

Maladaptive Personality Profiles in Criminals and Substance Abuse

It is well documented that the prevalence of personality disorders in offenders is reported to be significantly higher than that found in the general population, with estimates for the latter group ranging from approximately 10% to 15% (Verheul & van den Brink, 1999 as cited in Verheul, 2001). By comparison, a recent study in Canada found that just over one third (34.4%) of federally incarcerated men had a personality disorder (Dutton & Hart, 1993), although estimates have been proposed to be as high as 90% by some (Neighbors, 1987). The most common type of personality disorder in

offenders is antisocial personality disorder (ASPD), with prevalence rates ranging from 50% to 80% of all incarcerated adult male offenders (Hare, 1983; Robins, Tipp, & Przybeck, 1991). The key feature of ASPD is a pervasive disregard for the rights of others and a violation of these rights (American Psychiatric Association, 2000). Therefore, such high rates of this disorder in prison populations is perhaps not surprising given that the diagnostic criteria for this disorder include law-breaking behaviour. Furthermore, these individuals present with a host of traits that are commonly associated with criminality, such as impulsivity, aggressiveness, and reckless behaviours (American Psychiatric Association, 2000).

A related personality disorder that is prevalent in prison populations is psychopathy, reported in 10% to 25% of adult male offenders (Hare, 2003). Even though ASPD and psychopathy are similar in many respects, the criteria for ASPD outlined in the DSM-IV are dominated more by the behavioural indicants of this disorder (e.g., impulsivity, aggressiveness), with only two personality-oriented criteria (i.e., lack of remorse and deceitfulness), and less emphasis on affective and interpersonal characteristics. Psychopathy, on the other hand, includes several affective and interpersonal features, as well as the behaviours that define simple antisociality. Affectively, psychopaths tend to display shallow and short-lived emotions, and often present with a lack of empathy and guilt (Hare, 2003). In the behavioural domain, these individuals are frequently described as sensation-seeking, irresponsible and impulsive, whereas interpersonally they have a tendency to be manipulative, egocentric and dominating. As with ASPD, many of these features show clear relationships with

criminal activity (Pozzulo, Bennell, & Forth, 2006), and are highly comorbid with SUDs in offenders (Weekes & Morison, 1993; White, Ackerman, & Caraveo, 2001).

In addition to this epidemiological and descriptive data on diagnosable personality pathology, research exploring "normal" dimensions of personality suggests that offenders, as a group, are markedly more impulsive and sensation-seeking than their non-offending counterparts (Bergeron & Valliant, 2001; Longato-Stadler, Von Knorring, & Hallman, 2002). They are also often characterized as displaying higher levels of nervous tension, distress, anxiety, hostility, and aggression compared to members of the general population (Bergeron & Valliant, 2001; Longato-Stadler et al., 2002). Unfortunately, what is frequently missing from this research is a unifying theoretical framework for studying personality. Theories are important not only for allowing one to make the transition from simply describing behaviour to understanding behaviour, but also for ensuring consistency in how a construct is measured (Weiten, 1998). Within the area of offender rehabilitation, a unifying theoretical framework of personality could further serve to guide correctional planning decisions, such as the appropriate assignment of at-risk offenders to substance abuse treatment. Although research on the dimensional nature of personality in offenders using Tellegen's (1982) three-factor model is virtually nonexistent, the above description of offenders indicates that they may be characterized by low levels of CON and elevated levels of NEM. The two personality disorders that have garnered the most research in criminal populations, namely ASPD and its related counterpart, psychopathy, have been examined in relation to this model, and provide convergent support for the commonality of this personality profile among offenders (DiLalla, 1989; Patrick, 1995; Verona, Patrick, & Joiner, 2001). Though traits

characteristic of PEM have seldom been noted amongst criminal populations, whether the absence of such traits being documented in the literature is the resultant effect of the overwhelming tendency for researchers to focus on the more pathological traits characteristic of offenders (e.g., Cohen et al., 2002; Forbey & Ben-Porath, 2002; White et al., 2001), or is in fact due to their seldom experiencing positive emotional states, remains unknown. However, given that offenders appear to have a propensity towards negative affective states, it is conceivable that they may exhibit fewer traits characteristic of PEM relative to the general population.

While few studies have extended the use of the MPQ to evaluate its relationship to substance abuse in incarcerated samples, preliminary research suggests that Stress Reaction, one of the primary trait scales that defines NEM, may be positively related to problematic alcohol and drug usage, and Aggression, also a feature of NEM, may be related to the development of drug-related but not alcohol-related problems (Lyons, Casbon, Curtin, Patrick, & Lang, 1998). These findings therefore imply that two personality patterns may exist in offenders that render them susceptible to the development of substance-related problems, one in which the offender has a generally anxious disposition characterized by extreme negative reactions to stress and another that is characterized by a pattern of aggression and hostility, both of which can be encapsulated under the higher-order rubric of NEM. The relatively robust link between impulsivity and substance abuse mentioned above (e.g., Chassin et al., 2004; Krueger, 1999; Sher et al., 2000), coincident with the well documented impulse control deficits amongst offenders (Bergeron & Valliant, 2001; Longato-Stadler et al., 2002), also shows that low levels of CON may emerge as a prominent predictor of substance abuse for these

individuals. These findings support the potential relevance of studying normal-range personality traits in deviant populations.

Motivations for Substance Use

Although the research examining the relationship between personality and SUDs has a long tradition, few studies have attempted to address the *mechanisms* through which personality influences the development of substance-related problems. What is apparent from the empirical literature to date is that personality only accounts for a portion of the variance in SUDs (e.g., Mulder, 2002; Ruiz et al., 2003), highlighting that other variables are quite clearly implicated in their development. One factor which may be linked to an individual's personality style is his or her motivation for substance use. Indeed, most formal definitions of personality emphasize that it involves behaviours and emotions that are characteristic of an individual, are stable over time, and have some *motivational* significance (Mulder, 2002). A review of the literature reveals that motivation for substance use could be a key variable in the pathogenesis of substance abuse and dependence (Galen, Henderson, & Coovert, 2001; Henderson & Galen, 2003; Loukas et al., 2000), and thereby deserves consideration amongst offenders.

A large body of research has documented that the reasons individuals use substances may vary considerably, but can generally be grouped according to three motives: to decrease negative affect (i.e., coping motives), to increase positive affect (i.e., enhancement motives), and to achieve social goals, such as peer acceptance or to facilitate interaction with others (i.e., social motives) (Cooper, Frone, Russell, & Mudar, 1995; Cooper, Russell, Skinner, & Windle, 1992). In general, drinking to cope has been shown to be the most robust predictor of problem drinking relative to other drinking

motives (Cooper et al., 1992; Carpenter & Hasin, 1998), with coping motives found to prospectively predict the development of alcohol dependence (Carpenter & Hasin, 1998).

Other research has indicated that affective states and personality variables may interact with an individual's motives for substance use as coping motives have been linked to higher levels of depression, tension reduction expectancies, and problems in one's life (Cooper et al., 1995; Goldstein, Wall, McKee, & Hinson, 2000; Sher & Trull, 1994). In contrast, enhancement motives have been reported to be related to positive affect (Cooper et al., 1995). As such, coping and enhancement motives may have unique antecedents. Recent research also suggests that coping motives may mediate the relationship between positive and negative emotionality and substance use (Wills, Sandy, Shinar, & Yaeger, 1999). For example, in a sample of adolescents, Wills and colleagues (1999) found that PEM was actually associated with fewer coping motives for substance use and, consequently, less frequent substance use, while NEM was found to be associated with a greater motivation to use substances to cope, which, in turn, was related to more frequent substance consumption. Importantly, these findings generalized across alcohol, marijuana, and cigarette usage. Cooper and colleagues (1995) likewise provide support for the mediational role of coping motives in describing the relationship between NEM and problematic substance use, as well as the potential for enhancement motives to mediate the relationship between sensation-seeking and substance use and abuse. The evidence is somewhat weaker, however, for a relationship between positive emotional states and enhancement motives (Cooper et al., 1995). Comparable findings have been reported from studies of adults with SUDs (Henderson & Galen, 2003). These findings together suggest that individuals plagued by negative feelings appear to use alcohol and

other substances as a means of coping with such aversive states. It has been proposed that this may eventually lead to substance dependence as these individuals become reliant on its supposed "affect dampening" effect (Cooper et al., 1995; Loukas et al., 2000). In contrast, enhancers may be more strongly motivated to use substances as a result of their greater sensation-seeking proclivities, which may subsequently result in the development of problematic substance use patterns for some individuals.

In contrast to studies examining the relationship between drinking motives and personality in the general population, there is virtually no research addressing the personality-motivation nexus in offenders. Although the focus of the extant investigations with this group has been limited to the traits characteristic of psychopathy, they nevertheless provide support for the role of an individual's motivation for substance use as a mediator between personality and problematic substance use. In the first study, Lyons and associates (1998) used a sample of male prisoners, and examined whether the two factors that comprise psychopathy, assessed using the PCL-R, were related to problematic substance use via their relationship with motives. Contrary to what one would expect, given the usual characterization of criminals in general and psychopaths in particular as sensation-seeking and impulsive, the authors found that the antisociality factor of the PCL-R (Factor II), but not the emotional detachment factor (Factor I), was positively related to substance use, and that this relationship was mediated by coping motives rather than an inclination to pursue stimulation through indulgence (i.e., enhancement motives). Taking a somewhat different approach to evaluating the relationship between psychopathy and substance use, Reardon, Lang, and Patrick (2002) compared male inmates who revealed fewer traits characteristic of psychopathy to those

displaying higher levels of this personality disorder, and found the latter group to report more problematic alcohol use patterns. Similar to Lyons and colleagues' results, such problems were particularly evident among individuals who reported using alcohol to help them cope with negative emotions. Therefore, since individuals characterized by aggression, hostility and indifference toward others (i.e., high NEM and low PEM) tend to experience more interpersonal conflict and violence, it is possible that this group of offenders may actually come to rely on alcohol as a means of alleviating either their own personal distress or the distress they experience as a result of such interactional difficulties. Their impulsive nature also does not preclude the possibility that they use and abuse alcohol because they minimize the risks that may come with frequent consumption or as a result of a more generally hedonistic lifestyle, the latter of which may be associated with using substances as a means of increasing positive affect.

Given these findings, further exploration of offenders' motivations for substance use will be an important endeavour for researchers seeking to understand the development of SUDs, and whether their primary motivations differ from those commonly found in the general population. In addition, examination of such individuals' motives for using drugs will provide insight into the generalizability of the findings that have been obtained to date on individuals' motives for alcohol use.

Establishing Pathways to Substance Use Disorders

Over the past decade, a number of researchers have attempted to create models delineating the various trajectories leading to substance abuse and dependence disorders. Recently, Verheul and van den Brink (2000) proposed three dominant pathways to SUDs, in which personality and motivation for substance use both play central roles in the

pathogenesis of such disorders. The importance of normal personality dimensions is further underscored in this process.

The first pathway proposed by Verheul and van den Brink (2000), and the one that has received the most attention to date, is the behavioural disinhibition pathway. This pathway predicts that those who score high on traits such as antisociality and impulsivity, and low on harm avoidance, tend to have lower thresholds to deviant behaviours, including alcohol and drug abuse (Verheul & van den Brink, 2000). Individuals who follow this pathway would thus be characterized primarily by lower scores on MPQ CON (Iacono et al., 1999). The high comorbidity between SUDs and personality disorders that are characterized by impulse control deficits and notably low levels of CON (e.g., antisocial personality disorder, psyhopathy) (Iacono et al., 1999; Kruger, 1999; Krueger et al., 2001) provides support for this route to addiction. As such, of the three pathways, this pathway may be particularly salient in criminal substance abusers given their high rates of comorbid antisocial personality disorder (Miller & Lynam, 2003; Saulsman & Page, 2004). As noted previously, there is also ample evidence from longitudinal investigations of samples drawn from the general population that a clear relationship exists between traits characteristic of low CON and antisociality during childhood and the later manifestation of SUDs (Chassin et al., 2004; Caspi et al., 1997; Krueger, Caspi, Moffitt, Silva, & McGee, 1996; Masse & Tremblay, 1997; Sher & Trull, 1994). These findings together present strong support for the etiological significance of behavioural undercontrol in the manifestation of problematic substance use patterns. Though speculative, individuals falling within this pathway may be particularly vulnerable to

seeking and abusing substances as a means of enhancing positive affect due to their inability to delay impulses and their need for immediate gratification.

The second pathway to addiction, the stress reduction pathway, suggests that individuals at risk for developing addictive disorders score high on such traits as stress reactivity, anxiety sensitivity and neuroticism, and tend to react to stress with anxiety and mood instability (Verheul & van den Brink, 2000). As a result of these negative emotions, substances are purported to be used as a means of reducing the psychological distress they are experiencing. In support of this hypothesis, several investigators have found that those who drink primarily to cope tend to be more depressed, and believe that alcohol use will reduce their tension (Cooper et al., 1995; Henderson & Galen, 2003). As highlighted earlier using the MPQ, individuals with elevated levels of NEM are more likely to report coping motives for consuming alcohol relative to other motives, such as using alcohol as a means of increasing positive affect or facilitating social interaction (Cooper et al., 1995; Goldstein et al., 2000).

The third pathway proposed to lead to SUDs, the reward sensitivity pathway, predicts that individuals who score high on traits such as reward-seeking, novelty-seeking, and gregariousness tend to be motivated to use substances for their positive reinforcing properties (Verheul & van den Brink, 2000). Similar to the behavioural disinhibition pathway, low levels of CON may also be implicated in this pathway to addiction because of the conceptual overlap between this personality dimension and novelty-seeking. Additionally, indirect support for the potential importance of MPQ PEM in this pathway to addiction is suggested by the positive relationship between extraversion, a five-factor model personality dimension closely related to PEM (Church,

1994), and substance abuse (Sher et al., 2000). However, whether PEM is related to substance misuse has yet to be reliably demonstrated (Conway et al., 2002; Kruger, 1999). Similarly, its association with specific motives for using substances remains inconclusive (Cooper et al., 1995). As individuals high in PEM tend to enjoy social interaction (Cooper et al., 1995), it is plausible that substances may be used by this group on a more frequent basis since many social engagements involve the use of alcohol and other recreational drugs. Use of substances for social facilitation may therefore be related to this personality factor.

Rationale for the Current Study

As is evident, the rapidly expanding literature on risk factors for the abuse of drugs and alcohol has provided important insights into the multiple trajectories leading to substance abuse and dependence disorders, and has clearly underscored the significance of personality and motivational influences in this process. Nevertheless, several shortcomings in the literature continue to leave many questions unanswered. Most importantly, a substantial portion of the research examining the relationship between maladaptive personality and substance abuse has focused on personality disorders. In contrast, researchers have devoted far less attention to the broadband personality traits that may underlie these disorders. Studies using the dimensional approach to study normal-range traits are just now beginning to emerge. These investigations have shown that those with substance abuse problems typically differ from controls on several of the broadly defined dimensions of personality incorporated in the MPQ proposed by Tellegen (1982). Unfortunately, these studies have largely been confined to samples drawn from the general population (e.g., Conway et al., 2002). To date, there are but a

handful of studies which have applied the MPQ to understanding substance abuse in offenders. The disproportionately high rate of SUDs among incarcerated individuals relative to the general population (Bushnell & Bakker, 1997; Peters et al., 1998) clearly suggests that gaining a better understanding of the role and types of personality pathology manifest by this population is an area in desperate need of attention. Such insight may provide vital clues into the pathways that lead to the development of substance-related problems in this group of individuals.

Another major limitation of the extant research on personality and substance abuse is the tendency to simply report whether correlations exist between measures of personality and SUDs without exploring the mechanisms through which personality may come to influence the development of such conditions. Personality variables may exert a direct impact on substance abuse patterns, and/or they may act indirectly through another mechanism (e.g., motivational factors). Research of this sort is particularly limited in prison populations. Determining how personality influences the development of SUDs in offenders will undoubtedly bear important implications for the development of treatment programs for this population.

Beyond the dearth of research addressing pathways to addiction in offenders, several additional limitations characteristic of much of the work in this area to date are noteworthy. In general, there has been a tendency for research on personality and substance abuse to focus on a single type of substance being abused (e.g., Reardon et al., 2002), thereby restricting the generalizability of findings. A number of recent studies indicate, however, that prominent dimensions of personality may differ according to the type of substance being abused (e.g., alcohol vs. drugs) (Conway et al., 2002; McGue et

al., 1999; Sher et al., 2000; Trull, Waudby, & Sher, 2004). It therefore seems prudent for future research to examine the commonalities and differences in the dimensions of personality that correlate with different types of substances being misused. This study sought to address these limitations.

Purpose of the Present Study and Hypotheses

Based upon the review of the clinical literature that has related personality dimensions to individuals with SUDs in the general population, in conjunction with the correctional literature showing that measures exist for effectively classifying offenders into SUD groups (i.e., the ADS and DAST described below) (Kunic & Grant, 2005; Robinson, Porporino, & Millson, 1991; Vanderburg, Millson, & Weekes, 1994), the initial intent of this study was to examine how the dimensional model of personality embodied in the MPQ could help to inform our understanding of substance use *disorders* within a correctional sample. The well documented high prevalence rates of SUDs and polysubstance dependence among federal offenders (CSC, 2001; Weekes, Moser, & Langevin, 1999) suggested that obtaining a sufficiently even distribution of offenders with alcohol use disorders (AUDs) and drug use disorders (DUDs) would be an attainable goal so that the specificity of personality traits according to the type of SUD diagnosis could be studied. Furthermore, with relatively comparable rates of alcohol and drug use disorders expected, it was anticipated that a sizeable proportion of offenders would present with polysubstance dependence disorders, thus enabling a comparison of the AUD and DUD results with this third diagnostic category. Upon reviewing the data, however, it became evident that comparable proportions of offenders were not being allocated to these diagnostic categories, thereby precluding one's ability to confidently

evaluate the role of normal-range personality traits in their development according to diagnostic categories. Consequently, it was decided that examination of the relationships between the independent variables under study and continuous indices of the *severity* of alcohol and drug dependence *symptoms*, separately, would be more appropriate. This eliminated the third diagnostic category, polysubstance dependence, altogether. Therefore, although one of the goals of the current investigation, which was to provide a general description of the dimensional personality profiles characteristic of incarcerated offenders with identified substance abuse needs, remained unchanged, the specificity of these traits according to the type of SUD diagnosis had to be modified to address specificity with respect to the severity of alcohol and drug dependence symptoms. As such, only the second and third hypotheses which addressed the strength of the correlations between the MPQ personality traits and SUDs, and issues of specificity, respectively, had to be modified. The second goal of this investigation, to examine offenders' motives for substance use and the potential for such motives to serve to mediate the relationship between personality and substance dependence symptom severity, was initially proposed to be analyzed using the continuous measures of alcohol and drug use, and thus was not affected by the preceding decision.

Since very little research has been conducted on the areas outlined above with offenders, this project was largely exploratory in nature. Nonetheless, several hypotheses were proposed based on the available evidence enumerated previously. A review of the literature indicates that traits related to impulsivity or behavioural disinhibition and negative affect are elevated in offenders (Dennison, Stough, & Birgden, 2001; Krueger, Schmutte, Caspi, Moffitt, Campbell, & Silva, 1994; Longato-Stadler et al., 2002), and are

the most strongly and consistently associated with substance use and abuse problems (e.g., Krueger, 1999; Swendsen et al., 2002). PEM has been less consistently related to substance abuse (Conway et al., 2002; Kruger, 1999). In addition, based on preliminary work (McGue et al., 1999), there is reason to suspect that traits related to NEM would be specifically associated with alcohol abuse, whereas CON would be correlated predominantly with symptoms indicative of drug dependence. As the five-factor model Openness to Experience has been found to differentiate individuals with drug and alcohol use disorders (Flory et al., 2002), it was further proposed that the MPQ Absorption scale would be elevated in offenders with more severe symptoms of drug but not alcohol dependence given the association of this dimension with Openness to Experience (Glisky, Tataryn, Tobias, Kihlstrom, & McConkey, 1991). Thus, these hypotheses can be summarized as follows:

Hypothesis 1: Offenders, as a group, would present with a profile characterized by low levels of CON, elevated levels of NEM, and depressed levels of PEM compared to published norms.

Hypothesis 2: Low levels of CON and high levels of NEM would emerge as the strongest correlates of substance dependence symptom severity relative to PEM.

Hypothesis 3 (Specificity Hypothesis): NEM-related traits would be associated primarily with alcohol dependence symptoms, whereas CON-related traits would be associated primarily with symptoms of drug dependence. Absorption would only be associated with the measure of drug dependence symptomatolgy. Again, no specific hypotheses were made for PEM.

In terms of the relationships between personality and motives, contemporary research suggests that offenders plagued by NEM tend to report using substances to cope with their negative affect, while those characterized by PEM report more social or enhancement motives (Cooper et al., 1995; Wills et al., 1999; Verheul & van den Brink, 2000). Though speculative, offenders low in CON may report a greater number of enhancement motives due to their need for immediate gratification and impulse control deficits. Pathway models to SUDs (e.g., Verheul & van den Brink, 2000) further indicate that personality may make offenders vulnerable to the development of SUDs through their relationship with individuals' predominant motivations for substance use. Hence, the following hypotheses were proposed:

Hypothesis 4: Offenders exhibiting high levels of NEM would report more coping motives for using substances, while those characterized by elevated levels of PEM would report fewer coping motives and more social and/or enhancement motives for substance use. Offenders low in CON would report a greater number of enhancement motives.

Hypothesis 5 (Mediator Hypothesis): Offenders' motives for substance use would mediate the relationship between NEM, PEM and CON, and the severity of substance dependence symptoms.

Method

Participants

A total of 98 male federal inmates with identified substance abuse needs participated in this study. Participants were recruited from two minimum-security (n = 66) and two medium-security (n = 32) correctional facilities in the Ontario region.[1] As discussed in greater detail below, offenders were eligible to participate if they exhibited "some" or "considerable" needs in the substance abuse domain at intake assessment or currently had identified substance abuse needs. Since this was a questionnaire-based investigation, an inability to read and understand English precluded participation.

Materials

Demographics and Background.

Offender Management System (OMS). Demographic and background information were obtained by the researcher from the OMS, an automated database at the Correctional Service of Canada containing offender file information, and transferred to the *Background Information Form* (see Appendix A). The following descriptive characteristics were obtained for each offender: age, ethnicity (i.e., Caucasian, Aboriginal, Black, Asian, Other), education level at intake assessment, current marital status (i.e., married/common law; widowed, divorced, or single; unknown), type of offense(s) currently incarcerated for, length of original sentence, and number of days in a substance abuse treatment program. Offenders' educational level was obtained from their intake assessment which used the Canadian Adult Achievement Test (CAAT). Scores from two broad categories of the CAAT determine the grade level at which an inmate is

[1] Minimum-security facilities: Pittsburgh Institution and Frontenac Institution. Medium-security facilities: Joyceville Institution and Bath Institution.

currently functioning: Language Grade Level and Math Grade Level. An inmate is assessed as functioning at the grade level corresponding to the lower of these two scores, so that a CAAT score of 5.2 in the language domain and a score of 11.9 in the math domain, for example, would show that the individual was functioning at the grade 5 level.

In terms of the types of offenses committed, all of the offenses for which the individual was currently serving time were initially recorded. Subsequent examination of the offenses listed revealed that the following broad categories provided a comprehensive portrait of the predominant types of offenses for which participants were currently serving their sentence: homicide/attempted homicide, assault/aggravated assault, sexual offense, drug-related offense, driving under the influence (DUI), break and enter, robbery, theft, fraud, and arson. Each offense category was coded in a dichotomous manner so that a score of 1 indicated that the participant was serving time for the offense in question, while a score of 0 indicated that they were not. As such, participants could be listed under multiple offense categories. For descriptive purposes, whether they were serving their sentence for multiple offenses was similarly coded in a binary fashion (i.e., 1 = yes, 0 = no).

Finally, the length of time in substance abuse treatment was calculated as the number of days from the beginning date of the program until the end date listed, excluding all weekends.[2]

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[2] Although correctional programs are typically held two to four days per week, beyond acquiring inmates' pay stubs, it is not possible to determine the exact number of sessions actually attended. Consequently, it was decided to assume a 5-day per week attendance rate for the purpose of ease and consistency. It should be noted that this will inflate the number of days in treatment reported herein.

Personality Assessment.

Multidimensional Personality Questionnaire – Brief Form (MPQ-BF; Patrick, Curtin, & Tellegen, 2002).[3] This 155-item self-report measure is an abbreviated version of the MPQ originally developed by Tellegen (1982) (see Appendix B). It contains 11 primary trait scales which, in turn, form a three-factor higher-order structure. The first higher-order factor, positive emotionality (PEM), is comprised of four primary trait scales, including those labeled Well-Being, Social Potency, Achievement, and Social Closeness. High scores on PEM indicate a propensity to experience positive emotions and to enjoy interacting with others and one's environment. The second higher-order factor, negative emotionality (NEM), is assessed through three primary trait scales: Stress Reaction, Alienation, and Aggression. High scores on NEM reveal a tendency to experience negative mood states, such as anger, anxiety, and alienation from others. The third higher-order factor, constraint (CON), is measured via three primary scales, including those labeled Control, Harm Avoidance, and Traditionalism. Since individuals scoring high on this factor tend to adhere to traditional values and respond to their environment with caution, deliberation, and restraint, those scoring low on CON are likely to endorse nontraditional values, to be risk takers, and to manifest high levels of impulsivity. The final primary trait scale, Absorption, does not load primarily on any of the three specific higher-order factors, but was considered by the authors to tap an important dimension of adult personality, with high scores on this trait indicative of a propensity toward imaginative and self-involving experiences. The MPQ-BF also

[3] Although the NEO Five-Factor Inventory (Costa & McCrae, 1992), which is based on the FFM, continues to be one of the more widely used personality instruments, the MPQ-BF was selected for the present study due to its superior fit with contemporary pathway models to the development of SUDs, and as a result of cost considerations.

contains a useful stand-alone measure of social desirability referred to as the Unlikely Virtues (UNVIR) scale. The UNVIR scale provides an index of the degree to which individuals wish to portray themselves in an overly favourable light, with high scores indicating a tendency to claim uncommon virtuousness or to deny common frailties. Using this questionnaire, each participant was asked to indicate whether the statement was true or false of his attitudes, opinions, interests, and other characteristics.

Principle components analysis and factor analysis have confirmed the three-factor higher-order structure of the full MPQ, and that this structure, as well as the unique loadings of the individual trait scales on NEM, PEM, and CON, were preserved in the development of the abbreviated version (Patrick et al., 2002). Correlations between the brief- and full-form primary trait scales were high (i.e., from .92 to .98), as were the internal reliability coefficients calculated for the MPQ-BF factors: PEM (.86), NEM (.81), and CON (.83). Alpha coefficients for the primary trait scales similarly ranged from .75 to .84 (Patrick et al., 2002).

Motives for Substance Use.

Drinking Motives Questionnaire (DMQ; Cooper et al., 1992). The DMQ is a self-report questionnaire which measures three different motives for drinking: social motives, coping motives, and enhancement motives (see Appendix C). It includes 15 items, with each response completing the statement: "How often do you drink…". For the purposes of the present study, following the work of Ward, Kersh, and Shanks (1997), this statement was modified to address any type of substance that the individual may have used. As such, the statement read as follows: "How often do you drink and/or use drugs…". Items on this questionnaire were rated on a four-point Likert-type scale,

ranging from *almost never/never (1)* to *almost always (4)*. For each subscale, items were summed such that higher scores reflected more importance given to that reason for using the substance. Internal consistencies (coefficient alphas) for the three scales have ranged from .76 to .86 (Cooper et al., 1992), and modification of the instructions to address motives for drug usage do not appear to affect the reliability of this measure (e.g., alpha coefficients ranged from .79 to .82) (Ward et al., 1997).

Substance Use.

Two standardized measures used in the assessment process for offender substance abuse programming, the Alcohol Dependence Scale (Skinner & Horn, 1984) and the Drug Abuse Screening Test (Skinner, 1982), were used to examine the severity of substance abuse. As noted earlier, although these scales were initially intended to be utilized for both categorization purposes (i.e., to achieve a diagnosis of alcohol and/or drug use disorder, respectively) and to provide continuous indices of alcohol and drug dependence symptom severity, because of the markedly uneven distribution of cases allocated to the diagnostic groups that were obtained, they were only used for categorization for general descriptive purposes. A copy of these questionnaires can be found in Appendix D.

Alcohol Dependence Scale (ADS; Skinner & Horn, 1984). The ADS is a 25-item self-report instrument that focuses on drinking behaviour in the previous 12 months prior to arrest, and is consistent with the DSM criteria for alcohol dependence. It measures impaired control over alcohol use, salience of alcohol-seeking behaviour, tolerance, withdrawal symptoms, and a compulsive drinking style. Total scores range from 0 to 47, with higher scores signifying a greater severity of alcohol dependence symptoms. This

instrument is comprised of five categories indicating the severity of alcohol dependence symptoms: no evidence of alcohol dependence (raw score = 0), low alcohol dependence (1-13), moderate alcohol dependence (14-21), substantial alcohol dependence (22-30), and severe alcohol dependence (31-47). The top two categories, "substantial" and "severe" alcohol dependence, were used to classify individuals as having an AUD in accordance with practices now in place at the Correctional Service of Canada.

Psychometric evaluations support the reliability and validity of the ADS as a measure of alcohol dependence symptoms. For example, providing a measure of internal consistency, coefficient alpha was reported to be .92 in the developmental study that included 255 participants with alcohol-related problems (Skinner & Allen, 1982), and coefficient alphas between .94 and .96 have been documented with Canadian offender samples (Weekes, Vanderburg, & Millson, 1995). The ADS also shows moderate correlations with DSM-based scores indicative of alcohol dependence ($r = 0.59$) (Kivlahan, Sher, & Donovan, 1989), as well as with other widely used measures of alcohol dependence and use, such as the Michigan Alcoholism Screening Test ($r = .79$) (Ross, Gavin, & Skinner, 1990). Additional research supports the validity and structure of this scale with incarcerated male offenders (Hodgins & Lightfoot, 1989), and its utility in facilitating substance abuse treatment planning in correctional settings (Kunic & Grant, 2005).

Drug Abuse Screening Test (DAST; Skinner, 1982). The DAST consists of 20 yes/no items concerning drug taking, drug dependence symptoms, and drug-related problems over the past 12 months prior to arrest. Total scores on this measure range from 0 to 20, with higher scores denoting a greater severity of drug dependence symptoms.

The DAST uses the same classification system as the ADS for categorizing individuals in terms of their severity of drug abuse: none (raw score = 0), low (1-5), moderate (6-10), substantial (11-15), and severe (16-20). The top two categories, "substantial" and "severe" drug dependence are used at the Correctional Service of Canada to diagnose DUDs. Initial psychometric analyses of the DAST were conducted with a sample of 256 patients seeking treatment for drug- and alcohol-related problems, and found the DAST to have excellent internal consistency with an alpha coefficient of .92 (Skinner, 1982). Comparable estimates have been reported with offenders ($\alpha = .88$) (Weekes et al., 1995).

In the present study, participants were assigned to a polysubstance dependence group if they scored high (i.e., they fell within the "substantial" or "severe" categories) on both the ADS and the DAST. Similar to the AUD and DUD diagnostic categories, the polysubstance dependence group was only used for describing the study sample.

Procedure

In order to identify potential participants, CSC staff provided a list of names of inmates with identified substance abuse needs based on their Program Assessment Tool (PAT) scores for the "Substance Abuse as A Contributing Factor to the Index Offense" domain. Their scores on this domain were ascertained based on offenders' responses to the Computerized Assessment of Substance Abuse (CASA) tool, or its predecessor, the Computerized Lifestyle Assessment Instrument (CLAI), at the time of intake to federal custody and/or currently if the assessment package was re-administered. Both of these instruments are used to explore the nature and seriousness of an offender's substance abuse problems and to guide program referrals (Kunic & Grant, 2005). Based upon their responses, offenders were assigned to one of the following three levels: "no need for

improvement," "some need for improvement," or "considerable need for improvement" in the substance abuse domain. Only offenders with "some" or "considerable" substance abuse needs qualified for inclusion in the study.

Once eligible participants were identified, a list was compiled for each of the four correctional facilities under investigation. Inmates were then contacted at random for participation, at which time a consent form describing the research components was delivered (see Appendix E). This form documented the general purposes of the study, and also asked if they would be willing to participate in any follow-up studies over a subsequent three-year period should the authors wish to examine the relationships between personality, motives, and substance abuse treatment outcome. Having consented to participate in the study and assured that their data would remain confidential, the questionnaires were administered. Following completion of the questionnaires, participants were debriefed as to the full purposes of the research and thanked for their participation. A copy of the debriefing form can be found in Appendix F.

Data Analyses

Data was entered and analyzed using SPSS version 12.0. Prior to conducting any analyses, the data was examined and cleaned. More specifically, all variables were checked for errors in data entry and missing data, for the presence of univariate and multivariate outliers, and for linearity, normality, homoscedasticity, homogeneity of variance, multicollinearity, and singularity.

In order to provide a general profile of the offenders in this study, descriptive statistics (i.e., means, standard deviations, and frequencies) on the demographic, offense-related, and program participation variables were obtained for the total offender sample,

separately for two broad groups of offenders, those with and those without, any type of identified SUD (i.e., alcohol and/or drug use disorders) and, finally, separately according to each of the specific SUD diagnostic categories (i.e., AUD, DUD, and polysubstance dependence). Since comparable proportions of offenders could only be classified according to whether they had *any* type of SUD diagnosis or no type of SUD diagnosis, between-group comparisons were performed for these two study groups and only for the purpose of sample description. For these analyses, univariate t-tests were used to explore potential between-group differences on the continuous background characteristics, whereas chi-square tests of independence were applied to assess such differences for the categorical outcome measures.

In order to examine the higher-order MPQ personality profile manifest by offenders as proposed in the first hypothesis, simple descriptive statistics (i.e., means, standard deviations) were obtained and studied in relation to those obtained for the normative non-offender sample used in test development (Patrick et al., 2002). Since the published means for the three higher-order factors (i.e., PEM, NEM, and CON) represented unstandardized regression estimates reflecting weighted sums on MPQ primary trait scores, these factor level scores were converted to unweighted mean scores so that direct comparisons could be made with those obtained for the present sample. This was accomplished by summing the primary trait scales, which were themselves unweighted, for each of their respective higher-order factors. Independent samples t-tests were computed by hand to analyze potential between-group differences on each of the higher- and lower-order traits. These tests were evaluated for significance using the *t* distribution provided in Howell (1999). Given the large differences in sample sizes

between the groups (i.e., study sample: $N = 98$ vs. normative sample: $N = 549$), the standard errors to be used in the denominator of the t-tests were determined applying the procedures outlined by Howell (1999). More specifically, the homogeneity of variance assumption was assessed by examining the ratio of the two sample variances being compared. If this ratio did not exceed four, so that one sample variance was no more than four times the other, then the homogeneity of variance assumption was satisfied (Howell, 1999). In this situation, the variances were pooled in the denominator of the t-test and the pooled *df* (i.e., N_1+N_2-2) were used to evaluate the results of the test. In the event that the ratio of the sample variances exceeded four, separate variance estimates were used to estimate the standard error in the denominator, and the smaller of N_1-1 and N_2-1 were used as the *df*. This provides for a more conservative test of any potential between-group differences (i.e., a lower probability of making a Type I error or concluding that there are significant differences between the groups when there are not) (Howell, 1999).

In order to examine the relationships between the three higher-order factors of the MPQ (i.e., PEM, NEM, and CON), as well as their corresponding lower-order primary trait scales, and the severity of alcohol and drug dependence symptoms (i.e., hypothesis 2), bivariate product-moment correlations were computed separately according to type of substance use. Since the ability of the three higher-order personality factors to predict symptom severity of both alcohol and drug abuse was of interest, linear regressions were also performed. For each of these regressions, the personality dimension was the predictor and the severity of symptoms reported was the outcome variable.

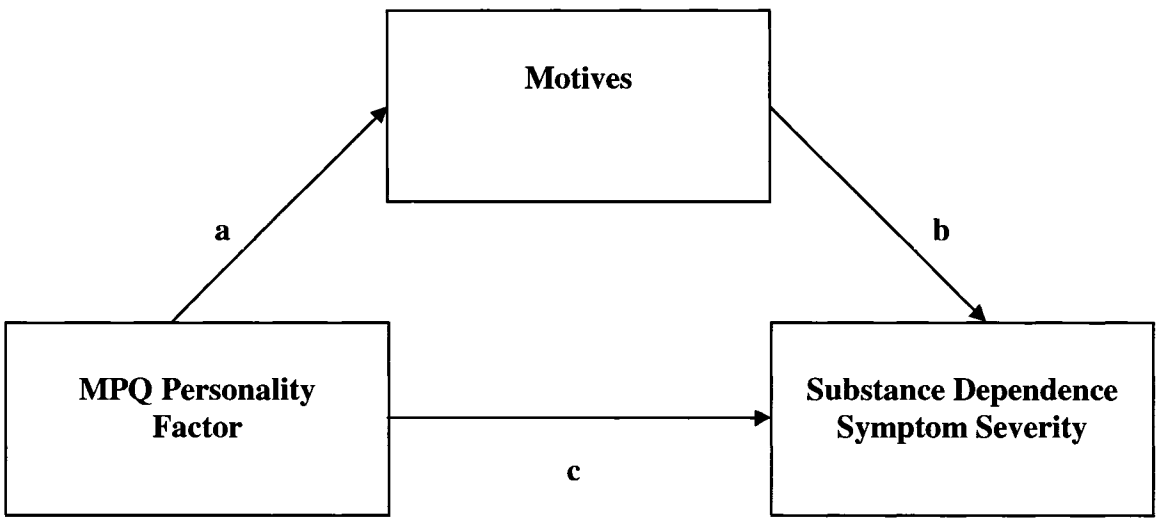
As an extension of these analyses, the third hypothesis, which sought to address the specificity of the personality dimensions according to type of substance dependence

symptom severity while controlling for other substance use, was explored by conducting a series of hierarchical regressions. Prior to these analyses, however, correlations between select demographic variables, the length of time in substance abuse treatment, and the MPQ personality factors were computed to examine potential covariates for inclusion in the regression models. Only those variables that were significantly correlated with, or showed a trend toward achieving a significant correlation with (i.e., $p<.10$), the dependent variable of interest (i.e., the personality dimension), were controlled for in subsequent regression analyses in order to eliminate them as potential confounds. For each of the hierarchical regressions, the higher-order personality factor (i.e., PEM, NEM, CON) or the stand-alone Absorption subscale was the criterion variable. Identified covariates were entered in the first step of the regression as needed. In order to assess the unique association between the personality factors and alcohol dependence symptom severity, participants' total scores on the measure of drug dependence symptom severity were entered in the first step (or second step if additional covariates were included in the model). Total scores on the alcohol dependence symptom severity index were then entered into step two (or three) of the regression equation. Similarly, to determine the unique association between the personality factors and drug dependence symptom severity, participants' total scores on the measure of alcohol dependence symptom severity were controlled for by entering them in the preceding step.

To address the fourth hypothesis, in which the associations between MPQ higher-order factors (and their lower-order trait scales) and motives for substance use were of interest, correlational analyses were performed.

Finally, to address the remaining mediational hypothesis required performing several linear and multiple regressions for the various linkages involved in the causal chain from which the independent variable was proposed to influence the response variable. To clarify the meaning of mediation, a path diagram is introduced to highlight these linkages (see Figure 1).

Figure 1: Path Diagram of Mediational Model



In order for a variable to function as a mediator, four statistical criteria must be met: (1) the predictor variable should be significantly associated with the mediator variable (Path a), (2) the predictor variable must be significantly associated with the criterion outcome variable (Path c), (3) the mediator must be significantly associated with the outcome variable, after controlling for the predictor variable, and (4) the previously significant predictor → criterion relationship should be substantially diminished when the effects of the mediator are controlled (Baron & Kenny, 1986). These four conditions were tested with a series of 3-step regression equations according to the procedures

outlined by Baron and Kenny (1986). In the first regression, the first condition was tested by regressing the mediator (i.e., motives) on the independent variable (i.e., MPQ personality factor). In the second regression, the second condition was tested by regressing the criterion variable (i.e., substance dependence symptom severity) on the independent variable (i.e., MPQ personality factor). Finally, the third regression equation tested steps three and four by regressing the outcome variable (i.e., substance dependence symptom severity) on both the independent and the mediator variables simultaneously. Separate coefficients for each regression equation were estimated and tested, and this series of regressions was repeated for each of the MPQ higher-order personality factors separately (i.e., PEM, NEM, CON), varying the type of motive (i.e., social, coping, enhancement), and the type of substance dependence symptom severity scores (i.e., alcohol dependence, drug dependence) in each analysis. According to the criteria above, a mediational model was supported in the present analyses when: MPQ personality factor scores were significantly associated with motives scores (condition 1); MPQ personality factor scores were significantly associated with substance dependence symptom severity scores (condition 2); scores on motives were significantly correlated with substance dependence symptom severity when the effects of the MPQ factor were controlled for (condition 3); and the significant MPQ factor → substance dependence symptom severity relationship was significantly diminished after controlling for the effects of motives (condition 4). It was only when conditions 1-3 were all satisfied, (i.e., either significance or a trend toward significance was achieved), that a formal test of whether the reduction in the independent variable → criterion relationship was *significantly* reduced (i.e., condition 4) was conducted. This was accomplished using Sobel's (1982, 1988)

significance test. This test essentially tests the significance of the indirect effect of the independent variable on the dependent variable via the mediator, which can be shown to be mathematically equivalent to whether a drop in the total effect (i.e., the zero-order predictor → outcome path) is significant upon inclusion of the mediator in the model (see MacKinnon & Dwyer, 1993). To conduct the statistical test for mediation, the unstandardized regression coefficients and their associated stand errors were used according to the procedures outlined by Holmbeck (2002). The percentage of the total effect that was mediated was also computed (MacKinnon & Dwyer, 1993). A detailed description of this process is provided in Appendix G.

Results

Data Screening

All data were re-checked for possible data entry errors and missing values. No errors were detected, and there were no missing values in the dataset. Dichotomous and categorical variables were assessed for extremely uneven distributions (i.e., for dichotomous variables, splits of 90% to 10% or worse; for categorical variables with more than two levels: variable levels that had memberships of 10% or less). Four of the 10 dichotomous offense-related variables had extremely low base-rates (i.e., base-rate <10%) and, consequently, were dropped from inferential analyses. These included whether offenders were serving their sentence for the following offense categories: sex offense, arson, fraud, and driving under the influence. Two of the multi-level categorical variables that were to be used in inferential analyses, ethnicity and substance use disorder diagnosis, showed extremely uneven distributions. As a result, such analyses were not undertaken with these variables.

In addition to screening the categorical variables, continuous variables were assessed for normality (skewness and kurtosis), and for the presence of univariate outliers. In order to examine whether the data were normally distributed, for each variable, histograms and normal probability plots were constructed, and skewness and kurtosis statistics were examined with values greater than +3 or less than -3 considered extreme (Tabachnik & Fidell, 2001). Three outliers were detected for the treatment status variable, and were recoded to the next highest value that was not considered an outlier (Tabachnik & Fidell, 2001). This improved the non-normality of the distribution.

The presence of multivariate outliers was tested via Mahalanobis distance test, with alpha set at 0.001 (Tabachnik & Fidell, 2001). No multivariate outliers were detected. In addition, prior to conducting the regression analyses, the distributions of all dependent and predictor variables to be used in these analyses were then examined for possible violations of statistical assumptions using multiple diagnostic plots and formal tests as recommended by Kutner and colleagues (2005). More specifically, scatterplots were constructed for each predictor and outcome variable combination to ensure that a linear regression function was appropriate for the data. Plots of the studentized residuals against the fitted values for the outcome variables were used to confirm linearity, as well as to diagnose departures from constancy of the error term variances (i.e., homogeneity of variance) and potential univariate outliers. Normal probability plots and histograms of the studentized residuals were created to examine the normality of the error term distribution. In terms of formal diagnostic tests, the Levene's test was used to ensure that the homogeneity of variance assumption was upheld, while the correlation test of normality and the Kolmogorov-Smirnov tests were used to further examine any potential departures from normality of the error term distributions. In the event that an assumption was violated, the Box-Cox procedure in SPSS was used to determine the most appropriate transformation for the variable. Only two variables, alcohol dependence symptom severity scores and enhancement motives scores required transformations, the former for a departure from normality, and the latter to correct unequal error term variances. Following these transformations, all diagnostic tests were repeated for these variables to ensure that no new assumptions were violated and to determine if they corrected the departures from the regression model. In both cases, the suggested power transformation

improved the model fit so that there were no longer any violations of assumptions. Thus, for these variables, regression analyses were performed on the transformed scores. A summary of these transformations, as well as the frequency distributions of categorical variables, and the means, standard deviations, and ranges of continuous variables, can be found in Appendix H. Finally, an inter-correlation matrix of the predictor variables to be used in regression analyses was calculated to screen for multicollinearity (i.e., correlations in excess of .80) and singularity. No problems with these assumptions were detected.

Sample Characteristics

Demographic Characteristics and Offense-Related Variables. As noted previously, a total of 98 male federal offenders completed the study questionnaires. The mean age of participants was 40.34 years (SD = 10.26), with a range from 20 to 61 years of age. In general, offenders overall educational level was low, with most assessed to be functioning at the grade 8 level using the CAAT (M = 7.88, SD = 2.94). A disproportionate percentage of the sample was of Caucasian ethnicity (85%) relative to all other ethnic groups (Aboriginal: 6%, Black: 6%, Asian: 1%, and Other: 2%). Nearly three quarters of the participants were single, widowed, or divorced (70%), whereas only 30% were married or in a common-law relationship.

An examination of the offense-related variables revealed that the average sentence length for those participating in this study was approximately 10 years (SD = 9.32)[4], and most were serving a determinate sentence (75%). Moreover, more than 60% of participants were serving their sentence for multiple offenses, with the most common

[4] Offenders serving an indeterminate sentence were assigned a sentence length of 25 years. Twenty-five percent of the sample was serving an indeterminate sentence when coded as: determinate = 1, indeterminate = 0.

being violent offenses, followed by theft and drug-related offenses (see Table 1). By comparison, the least common offenses were arson and fraud.

Table 1. Overview of Current Convictions[a]

	%	*n*/98
Offense Category		
Homicide/Attempted Homicide	28.57	28
Robbery	26.53	26
Theft	22.45	22
Drug-related Offense (possession, trafficking, importation)	17.35	17
Assault/Aggravated Assault	14.29	14
Break and Enter	14.29	14
Driving Under the Influence	8.16	8
Sexual Offense	8.16	8
Fraud	7.14	7
Arson	1.02	1
Multiple Offenses	62.24	62

Note. [a] Offenders may serve under more than one offense category.

Substance Use. Using the cutoffs described previously for the two measures of substance abuse severity (i.e., the ADS and DAST), 53 of the offenders (54%) who participated in this study had a diagnosable SUD, while the remaining 45 (46%) did not. Of those with an identified SUD, the vast majority of offenders (n = 41) had a DUD only, whereas only 4 had an AUD and no other concurrent SUD diagnoses. Eight offenders met the criteria for polysubstance dependence. As can be seen from Table 2, the vast majority of the participants were concentrated in the lower substance dependence categories for the measure of alcohol problem severity, while the reverse was true for drug usage. Finally, 67 participants (68%) participated in a substance abuse treatment program during their current sentence, with the average length of time in treatment being 64 days (SD = 71.60).

Table 2. Distribution of Results for the ADS and DAST

Problem Area	Severity Level (%)				
	None	Low	Moderate	Substantial	Severe
Alcohol (ADS)	27.55	44.90	15.31	9.18	3.06
Drugs (DAST)	14.29	17.35	18.37	24.49	25.51

Between-Group Comparisons. Given the substantial differences in sample sizes according to SUD group membership, comparisons amongst the diagnostic categories on the demographic, offense-related, and program participation variables were rendered uninterpretable. Descriptive statistics according to specific SUD diagnoses are available in Appendix I. Therefore, for descriptive purposes only, between-group comparisons are provided here for individuals with any type of SUD and those with no SUD diagnosis on the aforementioned background characteristics that were retained for analysis. These findings must be interpreted with caution, however, as the resultant distribution of offenders according to the specific type of SUD diagnosis highlighted above, suggests that the SUD "any" group was disproportionately comprised of offenders with DUDs. As such, it is not possible to determine whether the results gleaned from any of these between-group comparisons are more appropriately characteristic of offenders with DUDs or are also generalizable to those with any type of SUD. Table 3 gives an overview of the comparisons between offenders with a SUD and those without on the demographic and program participation variables. As is evident, there were no significant differences between the groups on age, marital status, or the length of their current sentence. In contrast, there were significant differences between the groups on

educational level and the length of time in substance abuse treatment. In both of these latter cases, offenders with a diagnosable SUD were functioning at a significantly higher level of education and were in a treatment program for a longer period of time, relative to their counterparts with no SUD diagnosis.

Table 3. Sample Characteristics for Offenders With and Without a SUD

	SUD[a]	No SUD[b]	Test Statistic
Variable	**M(SD) / %**	**M(SD) / %**	***t* / χ^2**
Age	39.42 (9.80)	41.42 (10.78)	-0.97
Education Level at Intake	8.43 (2.85)	7.24 (2.94)	-1.06*
Marital Status			1.42
Married/Common-Law	24.53%	35.56%	
Single, Widowed, or Divorced	75.47%	64.44%	
Ethnicity			N/A[1]
Caucasian	86.79%	82.22%	
Aboriginal	3.77%	8.89%	
Black	5.66%	6.67%	
Asian	1.89%	0.00%	
Other	1.89%	2.22%	
Length of Current Sentence (years)	8.76 (9.08)	10.76 (9.59)	-1.06
Time in Substance Abuse Treatment (days)	77.23 (75.70)	48.38 (63.68)	2.02*

Note. [a] $n = 53$; [b] $n = 45$.
[1]No inferential analyses were undertaken for ethnicity as the base-rates for categories other than Caucasian were too low, resulting in inadequate cell sample sizes for reliable comparisons.
*$p<.05$.

In terms of the offense-related variables, there were no significant associations between group membership and whether offenders were serving a determinate or indeterminate sentence, $\chi^2(1, N = 98) = 0.50$, $p>.05$, and whether they were serving their sentence in a minimum- or medium-security correctional facility, $\chi^2(1, N = 98) = 2.04$, $p>.05$. Approximately 77% of offenders with a SUD were serving a determinate sentence compared to 71% of those with no diagnosis, and most offenders in both groups came

from minimum-security institutions (SUD: 74%, no SUD: 60%). Similarly, there was no significant association between group membership and whether participants were currently incarcerated for more than one offense, $\chi^2(1, N = 98) = 0.69$, $p>.05$, with well over half of the offenders in each group serving their sentence for multiple offenses (SUD: 58%, no SUD: 67%). Between-group comparisons on the types of offenses participants were serving their current sentence for are illustrated in Table 4. The only offense category to achieve statistical significance was that of assault or aggravated assault, with considerably more offenders with no SUD diagnosis having been convicted for this type of offense.

Table 4. Comparison of Offense Categories for Offenders With and Without a SUD[a]

Offense	SUD (%)	No SUD (%)	Test Statistic (χ^2)
Homicide/Attempted Homicide	24.53	33.33	0.93
Sexual Offense	9.43	6.67	N/A[1]
Drug-Related Offense	16.98	17.78	0.01
Break and Enter	16.98	11.11	0.69
Robbery	28.30	24.44	0.19
Theft	26.42	17.78	1.04
Arson	1.89	0.00	N/A[1]
Fraud	7.55	6.67	N/A[1]
Driving Under the Influence	3.77	13.33	N/A[1]
Assault/Aggravated Assault	3.77	26.67	10.42***

Note. [a] Individuals may be classified under more than one offense category.
[1]Inferential analyses were not undertaken due to extremely low base rates (i.e., <10%).
***$p<.001$.

Hypothesis 1: Personality Profile of Offenders

Table 5 lists the means and standard deviations for the entire offender sample (N = 98) on each of the three higher-order MPQ personality factors: PEM, NEM, and CON, as well as those for their corresponding lower-order primary traits, the Absorption subscale and the measure of social desirability (i.e., Unlikely Virtues) included in this

questionnaire. Also provided within this table are the means and standard deviations for the normative sample used in test development and which produced valid profiles (n = 549), as well as the results of the comparisons between the study and normative samples. While this latter group contained mixed genders, the mean age (M = 40.30 years, SD = 12.20) was identical to that obtained for offenders in the present study.

Examination of the means on the three higher-order personality factors reveals partial support for the first hypothesis. As predicted, offenders in this study presented with a profile characterized by significantly lower levels of CON and elevated levels of NEM relative to the non-offenders in the normative sample. In contrast to expectations, offenders did not display lower levels of PEM as there were no significant differences between the groups on this factor. Perusal of the primary trait subscales across the groups shows that their mean scores were generally in the expected direction based on their corresponding higher-order factors. For example, examination of the lower-order traits comprising the CON dimension, which was lower for offenders compared to the published norms, indicates that offenders also exhibited significantly lower mean scores on Control, Harm Avoidance, and Traditionalism than the reference group. These findings suggest that offenders, as a group, tend to exhibit higher levels of impulsivity, enjoy taking risks, and are less likely to endorse traditional values compared to members of the general population.

Also in general alignment with their elevated overall mean score on the higher-order NEM factor, offenders exhibited higher mean scores on the Alienation and Aggression subscales relative to the reference group, although only the former achieved statistical significance. There were no significant differences between the groups on the

Table 5. Raw Score Descriptive Statistics on MPQ-BF

	MPQ-BF Raw Scores[a]				
	Study Sample		Normative Sample[b]		Test Statistic *t*
Scale	M	SD	M	SD	
PEM	**28.0**	**9.1**	**28.3**	**14.7**	**-0.20**
Wellbeing	7.6	3.5	8.7	2.9	-3.35***
Social Potency	5.5	3.2	4.8	3.6	1.80
Achievement	8.4	3.0	7.0	3.1	4.14***
Social Closeness	6.5	3.7	7.8	3.2	-3.61***
NEM	**12.6**	**8.1**	**9.6**	**14.6**	**1.98***
Stress Reaction	5.4	3.8	5.6	3.5	-0.51
Alienation	4.3	3.3	1.5	2.3	10.31***
Aggression	2.8	3.0	2.5	2.4	1.09
CON	**22.6**	**5.4**	**25.5**	**14.5**	**-3.52*** **
Control	7.8	2.9	8.5	2.6	-2.41*
Harm Avoidance	7.4	2.8	8.7	2.8	-4.23***
Traditionalism	7.4	2.3	8.3	2.9	-2.91**
Absorption	**5.7**	**2.9**	**5.5**	**3.1**	**0.59**
Unlikely Virtues	**3.9**	**3.0**	**3.4**	**2.4**	**1.82**

Note. [a] Raw scores on the MPQ-BF higher-order factors can range from 0-48 for PEM, and 0-36 for both NEM and CON. Score ratings for each of the primary trait subscales, including Absorption, range from 0-12, and Unlikley Virtues from 0-14. Study sample statistics are rounded to one decimal place to be consistent with published norms.
[b]Adapted from Patrick, Curtin, & Tellegen (2002). MPQ-BF = Multidimensional Personality Questionnaire – Brief Form; PEM = Positive Emotionality; NEM = Negative Emotionality; CON = Constraint.
*p<.05, **p<.01, ***p<.001; all tests were based on two-tailed levels of significance.

Stress Reaction subscale. These findings, taken together, suggest that even though offenders may have been no more likely to characterize themselves as irritable, anxious, nervous, or aggressive than non-offenders when examined at the lower-order trait level, they did tend to be more suspicious of others' motives and untrusting.

Finally, examination of the primary trait subscales comprising PEM for both the normative and study sample reveal that offenders scored significantly lower on Wellbeing and Social Closeness, and significantly higher on Achievement, than non-offenders. As such, offenders reported fewer emotions or traits consistent with feelings of happiness and satisfaction with their lives, and tended to be more distant toward others, compared to members of the general population. They were also more likely to consider themselves to be high achievers and to report that they enjoyed working at challenging tasks. In contrast, since there were no significant differences between the groups on Social Potency, this indicates that both groups were similar in their tendency to dominate social situations and in their perceptions of their ability to influence others.

Lastly, although no predictions were made concerning offenders' Absorption scale score, it is noteworthy that it was comparable to that reported for the normative sample. As total scores on this trait can range from 0 to 12, these findings suggest that both groups evidenced only moderate facility when it came to imaginative and self-involving experiences. Likewise, since the possible range of scores on the Unlikely Virtues scale is 0 to 14, the two groups showed comparably low tendencies to present themselves in an overly favourable light. This latter finding supports the validity of the response patterns obtained in this investigation.

Hypothesis 2: Strength of MPQ Factors in Predicting Substance Dependence Symptoms

The second hypothesis, which proposed that NEM and CON would emerge as the strongest correlates of substance dependence symptom severity, was supported when it came to the severity of *drug* dependence symptoms reported. The correlations between each of the MPQ factors and both alcohol and drug dependence symptom severity scores are provided in Table 6. As predicted, elevated levels of NEM were significantly associated with more severe symptoms of drug dependence, accounting for approximately 13% of the variance in severity scores, $R^2 = .13$, $F(1,96) = 13.68$, $p<.001$. Also in line with predictions, lower levels of CON revealed a trend toward being significantly correlated with more severe drug dependence symptoms, accounting for roughly 3% of the variance in the criterion, $R^2 = .03$, $F(1,96) = 3.36$, $p<.10$. In contrast, PEM was not significantly correlated with the severity of drug abuse symptoms, accounting for none of the variability in this outcome variable, $R^2 = .00$, $F(1,96) = .00$, $p>.05$.

An examination of the correlations between each of the primary trait subscales and scores on the DAST showed that two of the three subscales that comprise NEM were significantly positively correlated with drug dependence severity, and the third revealed a trend toward significance. Only one of the three CON subscales, Control, was significantly correlated with these severity scores and in the expected direction. This latter finding suggests that the impulse control deficits assessed by the Control subscale may be particularly influential when it comes to predicting which offenders will present with more severe symptoms of drug dependence relative to tendencies toward risk-taking behaviours (i.e., Harm Avoidance) and the endorsement of traditional values (i.e,

Table 6. Correlations Between MPQ-BF Traits and Alcohol and Drug Dependence Symptom Severity

Dimension and Subscales	Alcohol Dependence Symptom Severity	Drug Dependence Symptom Severity
PEM	**-.22* (-.23*)[1]**	**<.01**
Wellbeing	-.18†	-.07
Social Potency	-.08	.17†
Achievement	-.15	-.06
Social Closeness	-.19†	-.03
NEM	**.21* (.21*)**	**.35*** **
Stress Reaction	.24*	.37***
Alienation	.20*	.28*
Aggression	.04	.17†
CON	**-.22* (-.25*)**	**-.18†**
Control	-.27*	-.40***
Harm Avoidance	-.10	-.09
Traditionalism	-.14	.10
Absorption	**<.01**	**.12**
Unlikely Virtues	**-.18†**	**-.29***

Note. MPQ-BF = Multidimensional Personality Questionnaire – Brief Form; PEM = Positive emotionality; NEM = Negative emotionality; CON = Constraint.

[1]Correlations outside parentheses were performed on transformed Alcohol Dependence Severity (ADS) scores for PEM, NEM, and CON-related analyses, as appropriate. Correlations within parentheses were performed on the *un*transformed ADS variable. For clarity of presentation, correlations with the untransformed variable are only provided for the higher-order personality factors and not the subscales.

†$p<.10$; * $p<.05$; ***$p<.001$.

Traditionalism). Finally, as would be expected based on the poor ability of PEM to predict the severity of drug dependence symptoms, none of the subscales for this dimension was significantly associated with scores on the DAST, although there was a trend toward significance for Social Potency. This indicates that offenders who perceived themselves as being more forceful and adept at dominating social situations tended to show slightly more severe symptoms of drug dependence relative to those scoring lower in this domain.

In contrast to results obtained for drug dependence severity, the strength of the correlations between each of the higher-order personality factors and the severity of *alcohol* dependence symptoms reported were roughly comparable, with each revealing a moderate degree of association with this criterion and accounting for a roughly equal proportion of its variability (i.e., approximately 5%): PEM, $R^2 = .05$, $F(1,96) = 5.08$, $p<.05$; NEM, $R^2 = .04$, $F(1,96) = 4.45$, $p<.05$; and CON, $R^2 = .05$, $F(1,96) = 4.97$, $p<.05$. The directions of association suggest that lower levels of both PEM and CON among offenders were associated with more severe symptoms of alcohol abuse, whereas higher levels of NEM were associated with greater symptom severity. Evaluation of the primary trait subscales showed that two of the four scales comprising PEM, Wellbeing and Social Closeness, revealed a trend toward being significantly correlated with scores on the ADS. These findings indicate that offenders who reported being less satisfied with their lives and who described themselves as "loners" tended to report more severe symptoms of alcohol dependence compared to inmates who felt their lives had purpose and were fulfilling, and who enjoyed establishing relationships with others. As was the case when predicting drug dependence severity, two of the traits comprising NEM achieved

significant associations with alcohol abuse severity: Stress Reaction and Alienation. Higher scores on these indices are indicative of frequent mood swings, nervousness, and anxiety (i.e., Stress Reaction), and the tendency to be overly suspicious and untrusting of others' motives, which leads to estrangement (i.e., Alienation) – both of which were predictive of more severe alcohol abuse symptoms. Also in line with the findings for drug usage, the importance of impulse control deficits in predicting substance dependence severity was underscored for alcohol abuse, with Control being the only CON subscale to achieve significance in predicting the severity of alcohol abuse symptoms. Interestingly, the Unlikely Virtues scale was inversely related to both alcohol and drug dependence symptom severity, although it only achieved significance in the latter case. These findings suggest that offenders with more severe symptoms of substance abuse tended to display lower levels of social desirability than those with fewer or less severe symptoms. Lastly, the tendency to be imaginative and creative, as tapped by the stand-alone Absorption subscale, was not significantly associated with either index of substance abuse severity.

Hypothesis 3: Specificity of Personality Factors to Alcohol and Drug Dependence Severity

To gain a better understanding of the *unique* relations between substance use and personality according to the type of substance dependence symptoms reported, a series of hierarchical regressions were conducted. Prior to this, however, correlational analyses were undertaken between select background variables and the MPQ personality traits in order to identify potential covariates for inclusion in the regression models. Table 7 provides a summary of these correlations.

Table 7. Correlations Between MPQ-BF Factors and Background Characteristics

	Age	Education	Time in Substance Abuse Treatment
PEM	-.16	.03	-.22*
NEM	-.30**	.01	.03
CON	.13	-.16	-.06
Absorption	-.11	.01	-.15

Note. MPQ-BF = Multidimensional Personality Questionnaire – Brief Form; PEM = Positive Emotionality; NEM = Negative Emotionality; CON = Constraint. *p<.05; **p<.01.

As can be seen, age was significantly negatively correlated with NEM, whereas it was not significantly correlated with PEM, CON, or Absorption. As such, age was entered as a control variable only for the regression analyses seeking to predict NEM. Time in treatment was significantly inversely associated with PEM, while it was largely unrelated to NEM, CON, and Absorption. Consequently, this variable was only controlled for in the analyses involving PEM. Participants' level of educational functioning was not significantly associated with any of the personality traits and, thus, it was not necessary to control for this factor. It should be noted that additional analyses with the two background variables that were entered as covariates in only a subset of the analyses that follow (i.e., age, time in treatment) were also conducted where these variables were entered consistently across all regressions. Such analyses showed minimal changes to any results obtained, and had no effect on whether a predictor variable achieved significance. These findings therefore provided confirmation that they need not be included in the hierarchical analyses, thereby simplifying the presentation and interpretation of results.

In total, eight hierarchical regressions were conducted, the results of which are illustrated in Tables 8, 9, 10, and 11, according to the personality dimension being predicted by the indices of substance abuse severity. Standardized regression coefficients

for the variables in each step of the regression equations are presented. In addition, for each step, the R^2's, the changes in R^2's associated with the new predictor added to the model, and the F-ratio associated with this change along with its corresponding *df*s, are displayed. The reader is reminded that the number of steps may vary across the tables according to whether background characteristics were included as covariates in the model. Also, in order to ensure that nominal alpha levels were protected from any potential violations of statistical assumptions underlying the normality of the error term distribution (Kutner, Nachtsheim, Neter, & Li, 2005), the alcohol dependence severity variable was transformed, where indicated, according to power transformations suggested by SPSS. Note that any transformations of this variable were made on the basis of the diagnostic results associated with the simple linear regression of this variable with each of the personality factors separately. This procedure does not affect the interpretation of any of the results in these analyses.

As shown in Table 8, the first analysis sought to examine the ability of alcohol dependence severity scores to predict NEM above and beyond the potentially confounding age variable and concurrent drug dependence symptom severity. At the first step, age was entered into the regression equation and was found to be significantly inversely related to NEM, suggesting that younger offenders tended to report higher levels of NEM relative to their older peers. At the second step, drug dependence severity was found to be significantly positively related to NEM, and accounted for approximately 9% additional variance in this personality dimension incremental to the variance previously accounted for by age. Of most interest for the present purposes, however, were the findings gleaned from the third step of the analysis. When alcohol dependence

Table 8. Specificity of NEM to Alcohol and Drug Dependence Severity

	β	R^2	ΔR^2	*F* for ΔR^2	*df*
		Negative Emotionality			
Unique Predictive Ability of AD Severity:					
Step 1					
Age	-.30**				
Total Step 1		.09**	.09**	9.30	1,96
Step 2					
Age	-.24**				
DD severity	.31**				
Total Step 2		.18***	.09**	10.48	1,95
Step 3					
Age	-.27**				
DD severity	.28**				
AD severity[1]	.22*				
Total Step 3		.23***	.05*	5.86	1,94
Unique Predictive Ability of DD Severity:					
Step 1					
Age	-.30**				
Total Step 1		.09**	.09**	9.30	1,96
Step 2					
Age	-.33**				
AD severity[1]	.26**				
Total Step 2		.15***	.06**	7.20	1,95
Step 3					
Age	-.27**				
AD severity[1]	.22*				
DD severity	.28**				
Total Step 3		.23***	.08**	9.07	1,94

Note. Numbers were rounded to two decimal places; †$p<.01$; *$p<.05$; **$p<.01$; ***$p<.001$.
[1]AD = Alcohol Dependence; AD severity represents transformed scores for NEM-related analyses.
DD = Drug Dependence Severity.

severity was entered into this final step, it accounted for a further 5% of the variance in NEM above and beyond that already accounted for by drug abuse severity, and this increment was significant. Following similar logic when interpreting the results reported in the second portion of the table where the unique variance in NEM accounted for by *drug* dependence symptom severity (above and beyond alcohol abuse severity and age) was addressed, it is also evident that the degree of drug abuse symptoms reported accounted for significant incremental variance in NEM, having revealed an approximate 8% increase in explanatory power when it was added to the model in the final step. Since *both* alcohol and drug dependence symptom severity accounted for unique variability in NEM while controlling for the other type of concurrent substance abuse severity, these findings clearly run contrary to what was hypothesized. In fact, *drug* dependence severity was found to be *more* highly correlated with NEM, even when controlling for alcohol abuse, compared to the association between alcohol dependence severity and NEM when concurrent drug usage was controlled for. Indeed, all other factors being equal across the models, the analyses showed that drug abuse severity scores accounted for more unique variability in the criterion relative to alcohol abuse severity scores when drug usage was controlled for. Given the present findings, it appears that, for this group of offenders, NEM-related traits were actually associated more with symptoms indicative of the severity of drug dependence than they were with those suggestive of the severity of alcohol abuse. Since the specificity hypotheses were proposed based on the author's having anticipated that specificity would be examined according to substance use disorder *diagnoses*, the divergence of these results from initial predictions may be a result of the change in the operational definition of the predictor from disorders to substance

dependence severity. This possibility will be elaborated upon further in the discussion section.

Also running contrary to initial predictions, CON-related traits were found to be primarily associated with symptoms of alcohol dependence severity when controlling for concurrent levels of drug dependence symptom severity (see Table 9). In these analyses, introduction of scores on the measure of alcohol abuse severity in the final step of the regression model resulted in a 5% increase in the variance accounted for in CON beyond that already accounted for by symptom severity scores for drug abuse. However, CON-related traits do not appear to be an overly important discriminator between the severity of alcohol versus drug dependence symptoms as a trend toward drug dependence severity scores accounting for significant unique variability in these traits when alcohol severity was controlled for emerged in the subsequent regression. Furthermore, the additional variance accounted for by drug abuse severity (i.e., 3%) is comparable to the amount accounted for uniquely by the index of alcohol severity. As such, the presence of elevated levels of CON (i.e., high levels of impulsivity) may be most useful simply in terms of informing our understanding of the severity of substance abuse more generally as opposed to predicting the degree of substance abuse severity according to the type of substance being misused by offenders.

Table 9. Specificity of CON to Alcohol and Drug Dependence Severity

	β	R^2	ΔR^2	*F* for ΔR^2	*df*
		Constraint			
Unique Predictive Ability of AD Severity:					
Step 1					
DD severity	-.18†				
Total Step 1		.03†	.03†	3.36	1,96
Step 2					
DD severity	-.17†				
AD severity[1]	-.21*				
Total Step 2		.08*	.05*	4.70	1,95
Unique Predictive Ability of DD Severity:					
Step 1					
AD severity[1]	-.22*				
Total Step 1		.05*	.05*	4.97	1,96
Step 2					
AD severity[1]	-.21*				
DD severity	-.17†				
Total Step 2		.08*	.03†	3.10	1,95

Note. Numbers were rounded to two decimal places.
[1]AD = Alcohol Dependence; AD severity represents transformed scores for CON-related analyses.
DD = Drug Dependence Severity.
†$p<.01$; *$p<.05$; **$p<.01$; ***$p<.001$.

Although no predictions were made concerning the specificity of PEM-related traits to alcohol or drug dependence symptom severity due to the contradictory results obtained in prior research, the present findings suggest that PEM may be associated primarily with alcohol dependence symptom severity among offenders as it was not significantly related to the severity of drug dependence symptoms reported (see Table 10). As can be seen from the top portion of Table 10, after controlling for the potentially confounding treatment status variable, which remained significantly associated with PEM throughout each step of the analysis, as well as any of the variance accounted for by concurrent drug abuse symptoms, alcohol dependence severity scores were found to account for an additional 4% of the variance in PEM. In contrast, in the regression presented in the lower portion of this table, drug dependence severity was unable to account for any incremental variance above and beyond that already accounted for by the severity of alcohol abuse symptoms. Therefore, these findings taken together provide support for the specificity of PEM to alcohol abuse severity levels.

Finally, the results obtained for Absorption did not support the hypothesis that this personality dimension would be specific to symptoms of drug dependence (see Table 11). Alcohol dependence severity accounted for no variance in Absorption scores, and there was only a marginal increase in the variance accounted for when drug dependence symptoms were added to the model and alcohol abuse was held constant. This increase was not significant. As such, these results indicate that Absorption is not specific to either type of substance abuse.

Table 10. Specificity of PEM to Alcohol and Drug Dependence Severity

	β	R^2	ΔR^2	*F* for ΔR^2	*df*
		Positive Emotionality			
Unique Predictive Ability of AD Severity:					
Step 1					
Length of time in tx.[1]	-.22*				
Total Step 1		.05*	.05*	5.05	1,96
Step 2					
Length of time in tx.	-.24*				
DD severity	.06				
Total Step 2		.05†	<.01	0.30	1,95
Step 3					
Length of time in tx.	-.21*				
DD severity	.07				
AD severity[2]	-.20*				
Total Step 3		.09*	.04*	3.88	1,94
Unique Predictive Ability of DD Severity:					
Step 1					
Length of time in tx.	-.22*				
Total Step 1		.05*	.05*	5.05	1,96
Step 2					
Length of time in tx.	-.19*				
AD severity[2]	-.19*				
Total Step 2		.09**	.04*	3.77	1,95
Step 3					
Length of time in tx.	-.21*				
AD severity[2]	-.20*				
DD severity	.07				
Total Step 3		.09*	<.01	0.44	1,94

Note. Numbers were rounded to two decimal places; †*p*<.01; **p*<.05; ***p*<.01; ****p*<.001.
[1]tx = substance abuse treatment.
[2]AD = Alcohol Dependence; AD severity represents transformed scores for PEM-related analyses.
DD = Drug Dependence Severity.

Table 11. Specificty of Absorption to Alcohol and Drug Dependence Severity

	β	R^2	ΔR^2	*F* for ΔR^2	*df*
		Absorption			
Unique Predictive Ability of AD Severity:					
Step 1					
DD severity	.12				
Total Step 1		.02	.02	1.44	1,96
Step 2					
DD severity	.12				
AD severity	-.02				
Total Step 2		.02	.00	0.03	1,95
Unique Predictive Ability of DD Severity:					
Step 1					
AD severity	<-.01				
Total Step 1		.00	.00	0.00	1,96
Step 2					
AD severity	-.02				
DD severity	.12				
Total Step 2		.02	.02	1.45	1,95

Note. Numbers were rounded to two decimal places.
[1]tx = substance abuse treatment.
AD = Alcohol Dependence Severity; DD = Drug Dependence Severity.
$^{\dagger}p<.01$; $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.

Hypothesis 4: Relationships Between Personality Factors and Motives

The correlational analyses between each of the higher-order MPQ personality factors and offenders' motives for substance use revealed partial support for the fourth hypothesis (see Table 12). As predicted, NEM was most strongly associated with coping motives for substance use, with those offenders exhibiting higher levels of NEM reporting using substances as a means to cope with negative affective states more frequently than their counterparts who presented with lower scores on this personality dimension. Though not predicted, offenders displaying elevated NEM scores likewise reported significantly more enhancement motives suggesting that they also use substances to increase positive affective states. In accordance with expectations, offenders presenting with lower levels of CON reported significantly more enhancement motives for using substances relative to offenders scoring higher on this construct who reported fewer such motives. Lastly, the prediction that elevated levels of PEM would be significantly inversely associated with coping motives and positively correlated with social or enhancement motives was not supported at the $p<.05$ level of significance.

At the primary trait level of analysis, as is evident from Table 12, the significance and direction of association between each subscale and the various motives are in general agreement with their higher-order factors. Additionally, it is noteworthy that the Absorption scale was not significantly correlated with any of the types of motives under study. In contrast, the measure of social desirability was significantly negatively associated with each type of motive such that lower scores on Unlikely Virtues (or lower levels of social desirability) were associated with higher scores on coping, enhancement, and social motives for using substances.

Table 12. Correlations Between Personality Factors and Motives for Substance Use

	Motives		
Scale	**Coping**	**Social**	**Enhancement**
PEM	**-.15**	**-.11**	**-.05**
Wellbeing	-.14	-.09	-.10
Social Potency	-.04	.02	.13
Achievement	-.14	-.21*	-.11
Social Closeness	-.09	-.04	-.05
NEM	**.37*** **	**.16**	**.27** **
Stress Reaction	.40***	.16	.24*
Alienation	.30**	.17	.24*
Aggression	.17	.04	.16
CON	**-.18†**	**-.10**	**-.23***
Control	-.25*	-.29**	-.23*
Harm Avoidance	-.02	.12	-.13
Traditionalism	-.09	-.01	-.09
Absorption	**.05**	**-.04**	**.10**
Unlikely Virtues	**-.34** **	**-.23***	**-.31** **

Note. †$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$. PEM = Positive Emotionality; NEM = Negative Emotionality; CON = Constraint.

Hypothesis 5: Mediational Effects of Motives

As discussed in the data analysis section, in order to examine whether motives served to mediate the relationship between each of the higher-order MPQ personality dimensions and alcohol and drug dependence symptom severity, a series of 3-step regression analyses were performed. The first two steps were designed to address the first two conditions required to support a mediational model (i.e., the ability of the independent variable to predict the mediator (condition 1) and the ability of the independent variable to predict the criterion (condition 2), respectively), while the third

step assessed the remaining criteria (i.e., the ability of the mediator to predict the criterion variable (condition 3) and any reduction in the strength of the independent variable → criterion relationship when the effects of the mediator were controlled for as compared to when they were not in step 2 (condition 4)). As mentioned previously, condition 4 was tested using Sobel's (1982, 1988) significant z-test only in the event that conditions 1-3 were all met. At this juncture, it is important to note that, although it is not standard practice to test mediational models in the absence of a significant relationship between the independent and dependent variables since there is no effect to mediate (Rose, Holmbeck, Millstein Coakley, & Franks, 2004), for the purposes of providing complete results, as well as inherent interest in some of the findings that emerged, the results of all of the regression analyses are presented herein. In line with the practices performed for the specificity analyses, in order to ensure that nominal alpha levels were protected from any potential violations of the statistical assumptions underlying either the normality or the variance homogeneity of the distributions of residuals (Kutner et al., 2005), dependent and mediator variables were transformed, where indicated, according to power transformations suggested by SPSS. Note that any transformations of the dependent and mediator variables (namely, the ADS scale scores and the enhancement motives scores) were made on the basis of the diagnostic results associated with the initial, simple linear regressions of those variables with each of the personality factors separately, and that for each personality variable that transformation was then maintained across the tests involving each of the three mediator variables. This led to slight differences in the values obtained for the paths between the mediating motive variables and the dependent outcome variable across the various path diagrams outlined in the following figures.

Prior to conducting the mediator analyses, zero-order correlations were obtained for each of the motives for substance use and alcohol and drug dependence severity, and are shown in Table 13.

Table 13: Zero-Order Correlations Between Motives and Substance Dependence Severity[1]

	Alcohol Dependence Severity	Drug Dependence Severity
Social Motives	.48*** (.51***)	.25*
Coping Motives	.41*** (.39***)	.51***
Enhancement Motives	.25* (.25*)[a] (.19*)[b]	.56*** (.52***)

Note. [1]Correlation coefficients within parentheses represent correlations using transformed variables, where applicable, while correlations outside parentheses represent the associations between motives and the *un*transformed variables. Although scores on the Alcohol Dependence Severity Scale (ADS) had three different transformations according to the personality factor predicting them (as described in the text), only one was selected for presentation purposes since all three yielded virtually identical results.
[a]Correlation between transformed ADS variable and untransformed enhancement motives; [b]Correlation between transformed ADS variable and transformed enhancement motives.
*p<.05; **p<.01; ***p<.001.

Tables 14, 15, and 16 present a summary of each of the mediational analyses conducted for PEM, NEM, and CON and the alcohol dependence severity outcome variable. Tables 17, 18, and 19 summarize the mediational analyses for each of these personality factors and drug dependence severity. In addition to providing the unstandardized and standardized regression coefficients, the multiple coefficients of determination (i.e., R^2) are given for the total model to highlight the proportion of variability in the criterion accounted for by the predictor(s) entered. The partial correlations, which designate the association between one predictor variable and the criterion variable when the effects of the other predictor have been controlled for, are provided for the third step of each series of regressions so that the reader may compare this value to the correlation (i.e., the standardized beta in linear regression analysis = the

zero-order correlation) obtained prior to controlling for the effects of the other predictor variable. The test of whether the reduction in the strength of the independent variable → dependent variable relationship from step 2 to 3 was significant, or displayed a trend toward significance, is indicated under step 3 in the standardized beta column with the subscript "m." Finally, the semi-partial coefficient of determination is given to show the proportion of unique variability in the outcome variable accounted for by each of the predictors incremental to the other when entered into the third regression equation. Figures are provided for each of the mediational models tested to visually illustrate the paths where the models may have fallen short in terms of meeting the necessary criteria to establish mediation, as well as those models showing significant mediator effects.

Alcohol Dependence Symptom Severity. As may have been anticipated based on the failure to find any significant correlations between total scores on PEM and any of the motives for substance use in hypothesis 4, the findings in Table 14 and in the path diagrams that follow (i.e., Figures 2, 3, and 4) reveal that motives did not mediate the relationship between PEM and alcohol dependence symptom severity. The significant association between PEM and the severity of alcohol abuse suggests that PEM instead exerts a direct effect on the severity of symptoms manifest. Indeed, as is evident from the partial r's in Table 14, the association between PEM and scores on the ADS even remained significant in the third regression equations where the variance accounted for by social motives, $t(95) = -1.94$, $p<.05$, and enhancement motives $t(95) = -2.19$, $p<.05$, were controlled for, and continued to exhibit a trend toward significance when coping motives were held constant, $t(95) = -1.81$, $p<.10$. This is especially noteworthy given that each of these motives was found to be highly correlated with alcohol abuse symptom

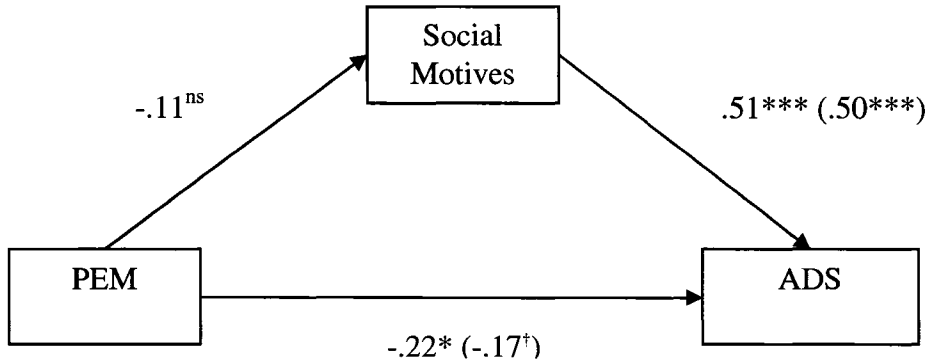
severity scores in the preceding correlational analyses (i.e., Table 13). Nevertheless, this interpretation is tempered by the fact that PEM still accounted for only a small proportion of the variability in the severity of symptoms presented (i.e., 3% to 5%), indicating that other variables not accounted for in this investigation clearly impacted the patterns of alcohol use reported by offenders displaying elevated levels of PEM.

Table 14. Regression Tests of Mediational Hypotheses for PEM and AD Severity

Step	b	SE of b	β	R^2	Partial r	Semi-partial r^2
Mediational Model #1						
Step 1: PEM predicting social motives	-.05	.05	-.11	.01		
Step 2: PEM predicting ADS[1]	-.08	.03	-.22*	.05		
Step 3: PEM and social motives predicting ADS				.29		
PEM	-.06	.03	-.17[ns]		-.20	.03
Social motives	.35	.06	.50***		.51	.24
Mediational Model #2						
Step 1: PEM predicting coping Motives	-.08	.06	-.15	.02		
Step 2: PEM predicting ADS[1]	-.08	.03	-.22*	.05		
Step 3: PEM and coping motives predicting ADS				.18		
PEM	-.06	.03	-.17[ns]		-.18	.03
Coping motives	.23	.06	.36***		.37	.13
Mediational Model #3						
Step 1: PEM predicting enhancement Motives	-.02	.05	-.05	.002		
Step 2: PEM predicting ADS[1]	-.08	.03	-.22*	.05		
Step 3: PEM and enhancement motives predicting ADS				.11		
PEM	-.07	.03	-.21[ns]		-.22	.05
Enhancement motives	.16	.07	.24**		.25	.06

Note. Symbols indicating significant and nonsignificant results are only provided for those statistics that correspond to the criteria necessary to establish mediation; $^{\dagger}p<.10$; $*p<.05$; $**p<.01$; $***p<.001$.
[1]ADS = Alcohol dependence severity; all analyses with ADS variable were based on transformed ADS scores for PEM-related analyses.
b is unstandardized beta; SE = Standard error of unstandardized beta; β = Standardized beta.
[m]Mediational model supported.
[ns]Mediational model not supported.

Figure 2. Path Diagram of PEM, Social Motives, and ADS Mediation



Note. Values on paths outside parentheses are standardized β's and represent zero-order correlations (r's). Coefficients within parentheses are standardized partial regression coefficients from equations that include the other variable with a direct effect on the criterion.
For all Figures: ADS = Alcohol Dependence Severity; nsNot significant; †p<.10; *p<.05; **p<.01; ***p<.001.

Figure 3. Path Diagram of PEM, Coping Motives, and ADS Mediation

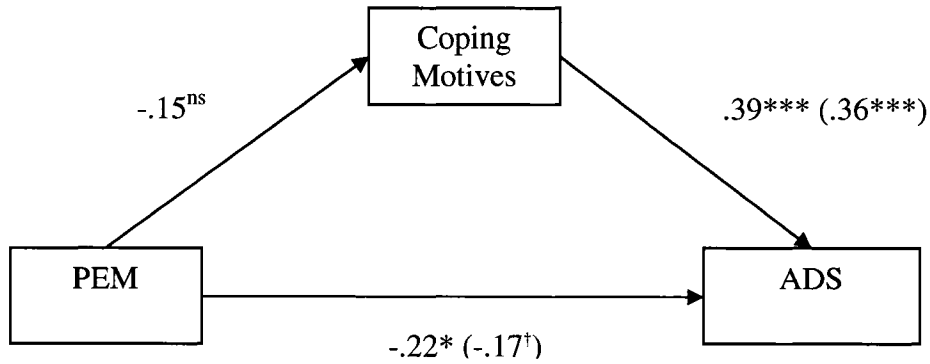
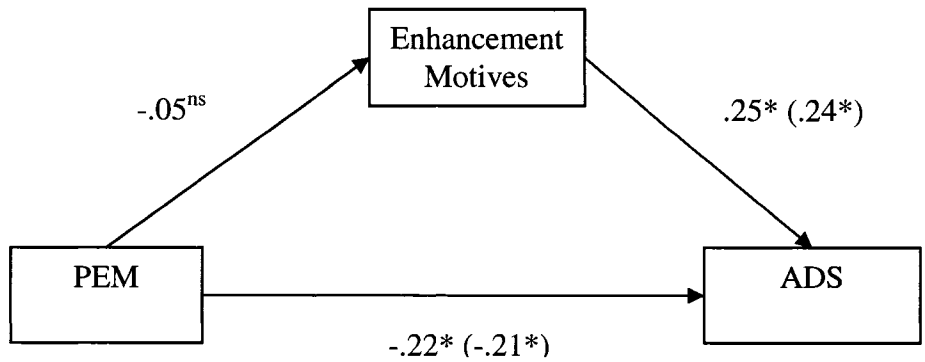


Figure 4. Path Diagram of PEM, Enhancement Motives, and ADS Mediation



In contrast to the results for PEM and alcohol abuse, two of the three mediational models constructed to explain the relationship between NEM and alcohol dependence symptom severity were supported (see Table 15). In particular, coping motives was found to be a significant partial mediator[5] of the association between NEM and the severity of alcohol abuse symptoms, accounting for approximately 63% of the relationship between these variables (see Appendix G for calculation of the percentage of effect mediated). Similarly, there was a trend toward enhancement motives partially mediating the relationship between NEM and the severity of alcohol abuse symptoms, with enhancement motives accounting for slightly more than one quarter (i.e., 27%) of the association between these variables. In both of these cases, elevated levels of NEM were associated with higher scores on coping and enhancement motives which, in turn, predicted more severe symptoms of alcohol dependence (see Figures 5 and 6, respectively). In contrast, social motives did not appear to exert a significant mediational effect on the relationship between NEM and alcohol dependence severity, likely due in large part to it not being significantly correlated with this personality dimension (see Figure 7).

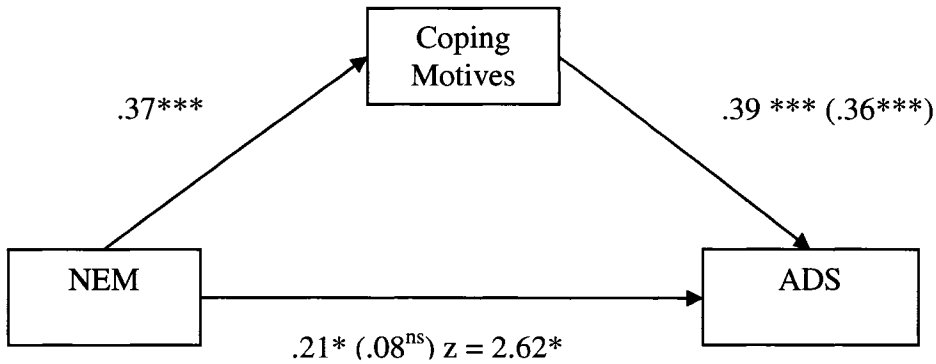
[5] The motives variable is said to partially mediate the relationship between the predictor and outcome variables as full mediation occurs only if the mediator accounts for 100% of the total effect. Since full mediation is highly unlikely in research in the social sciences, statistical analyses are typically used to examine whether there is significant or nonsignificant partial mediation (Baron & Kenny, 1986).

Table 15. Regression Tests of Mediational Hypotheses for NEM and AD Severity

Step	b	SE of b	β	R^2	Partial r	Semi-partial r^2
Mediational Model #1						
Step 1: NEM predicting social motives	.09	.06	.16	.03		
Step 2: NEM predicting ADS[1]	.08	.04	.21*	.04		
Step 3: NEM and social motives predicting ADS				.28		
NEM	.05	.03	.13[ns]		.15	.02
Social Motives	.35	.06	.49***		.50	.24
Mediational Model #2						
Step 1: NEM predicting coping Motives	.23	.06	.37***	.14		
Step 2: NEM predicting ADS[1]	.08	.04	.21*	.04		
Step 3: NEM and coping motives predicting ADS				.16		
NEM	.03	.04	.08[m]		.08	.005
Coping motives	.23	.06	.36***		.34	.11
Mediational Model #3						
Step 1: NEM predicting enhancement motives[2]	357.29	172.44	.21*	.04		
Step 2: NEM predicting ADS[1]	.08	.04	.21*	.04		
Step 3: NEM and enhancement motives predicting ADS				.07		
NEM	.07	.04	.18[m]		.18	.03
Enhancement motives	.00	.00	.16[†]		.16	.02

Note. Symbols indicating significant and nonsignificant results are only provided for those statistics that correspond to the criteria necessary to establish mediation; [†]$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$.
[1]ADS = Alcohol dependence symptom severity; all analyses with ADS variable were based on transformed ADS scores for NEM-related analyses.
[2]Enhancement motives represent transformed scores for NEM-related analyses.
b is unstandardized beta; SE = Standard error of unstandardized beta; β = Standardized beta.
[m]Mediational model supported.
[ns]Mediational model not supported.

Figure 5. Path Diagram of NEM, Coping Motives, and ADS Mediation



Note. Values on paths outside parentheses are standardized β's and represent zero-order correlations (r's). Coefficients within parentheses are standardized partial regression coefficients from equations that include the other variable with a direct effect on the criterion. The z-scores represent Sobel's test of the significance of the reduction in the IV → DV relationship when the mediator was controlled for as compared to when it was not.
For all Figures: ^{ns}Not significant; $^{\dagger}p<.10$; $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.

Figure 6. Path Diagram of NEM, Enhancement Motives, and ADS Mediation

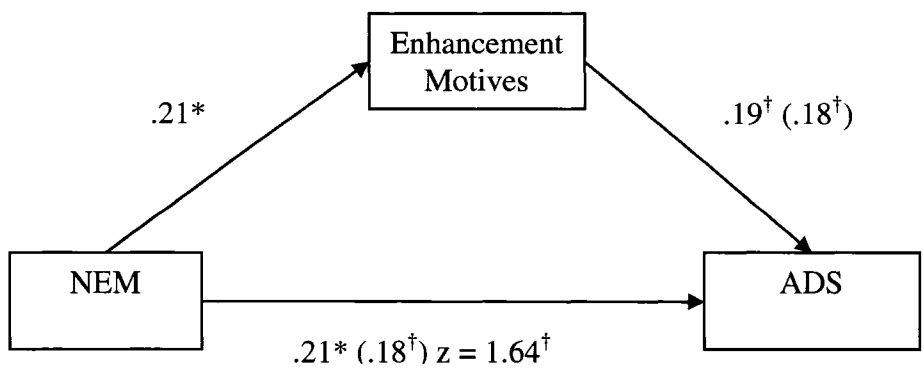
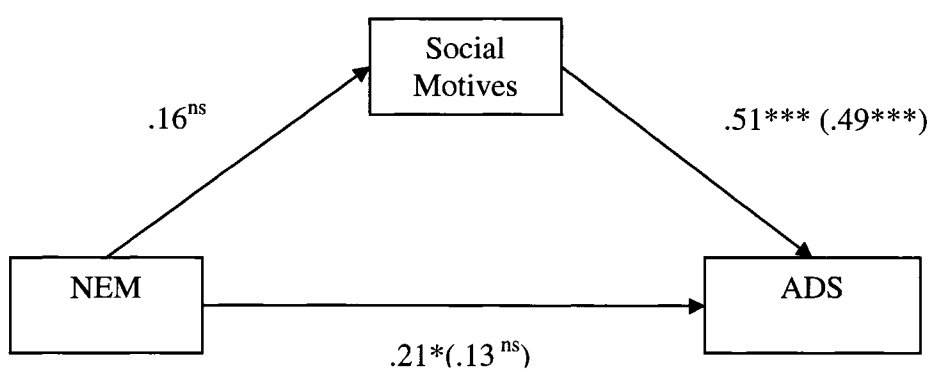


Figure 7. Path Diagram of NEM, Social Motives, and ADS Mediation



Similar to NEM, the results also showed that coping and enhancement motives partially mediated the relationship between CON and scores on the ADS, while social motives did not (see Table 16). As anticipated, lower levels of CON predicted higher scores on the coping and enhancement motives indices which, in turn, predicted more severe symptoms of alcohol dependence (see Figures 8 and 9, respectively). Introduction of coping motives into the model was found to account for 26% of the mediated effect between CON and alcohol abuse severity, indicating a trend toward partial mediation. Although enhancement motives also reduced the strength of the association between CON and ADS scores by roughly 21%, Sobel's test showed that this diminished effect was not significant. Social motives, on the other hand, were not found to be an important mediator in these analyses since it was not significantly correlated with this personality dimension (see Figure 10).

Table 16. Regression Tests of Mediational Hypotheses for CON and AD Severity

Step	b	SE of b	β	R^2	Partial r	Semi-partial r^2
Mediational Model #1						
Step 1: CON predicting social motives	-.08	.08	-.10	.01		
Step 2: CON predicting ADS[1]	-.07	.03	-.22*	.05		
Step 3: CON and social motives predicting ADS				.30		
CON	-.05	.03	-.17 [ns]		-.20	.03
Social motives	.18	.03	.50***		.51	.25
Mediational Model # 2						
Step 1: CON predicting coping Motives	-.17	.09	-.18[†]	.03		
Step 2: CON predicting ADS[1]	-.07	.03	-.22*	.05		
Step 3: CON and coping motives predicting ADS				.15		
CON	-.05	.03	-.16 [m]		-.17	.03
Coping motives	.11	.03	.32**		.32	.10
Mediational Model #3						
Step 1: CON predicting enhancement Motives	-.20	.09	-.23*	.05		
Step 2: CON predicting ADS[1]	-.07	.03	-.22*	.05		
Step 3: CON and enhancement motives predicting ADS				.09		
CON	-.05	.03	-.18 [ns]		-.18	.03
Enhancement motives	.07	.04	.20*		.20	.04

Note. Symbols indicating significant and nonsignificant results are only provided for those statistics that correspond to the criteria necessary to establish mediation; [†]$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$.
[1]ADS = Alcohol dependence symptom severity; all analyses with ADS variable were based on transformed ADS scores for CON-related analyses.
b is unstandardized beta; SE = Standard error of unstandardized beta; β = Standardized beta.
[m]Mediational model supported.
[ns]Mediational model not supported.

Figure 8. Path Diagram of CON, Coping Motives, and ADS Mediation

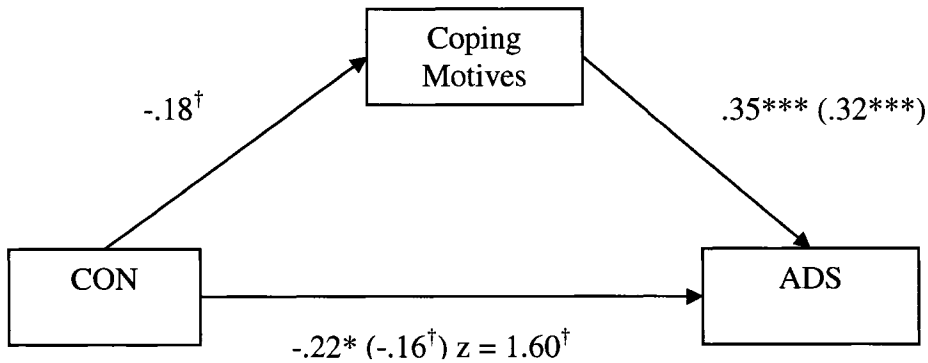


Figure 9. Path Diagram of CON, Enhancement Motives, and ADS Mediation

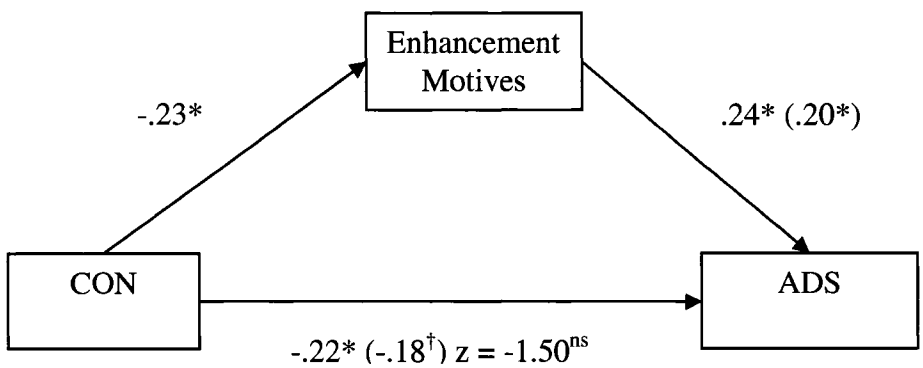
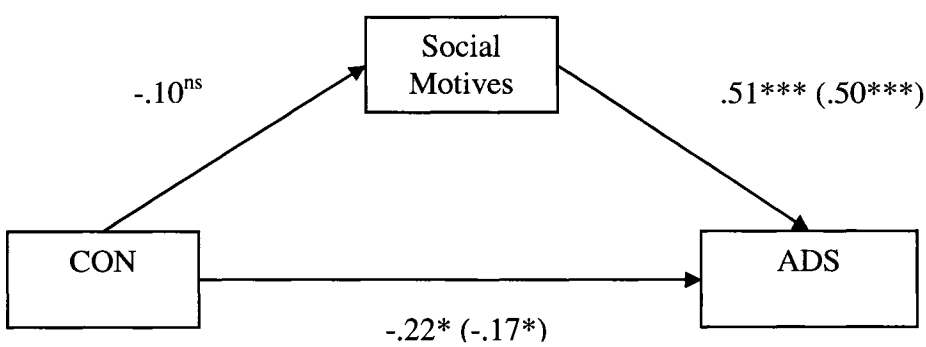


Figure 10. Path Diagram of CON, Social Motives, and ADS Mediation



Note. For all Figures: ^{ns}Not significant; $^{\dagger}p<.10$; $*p<.05$; $**p<.01$; $***p<.001$.

Drug Dependence Symptom Severity. Table 17 gives a summary of the regression results testing the mediational influence of motives in explaining the relationship between PEM and the severity of drug dependence symptoms reported. As would be expected given the failure to find a significant correlation between PEM and drug dependence severity scores, as well as the non-significant associations between PEM and any of the motives (hypotheses 2 and 4), none of the mediational models involving PEM and drug dependence was supported. These findings are illustrated in Figures 11, 12, and 13. It is noteworthy, however, that the relationships between each of the types of motives and the severity of drug dependence reported remained significant even after accounting for the contribution (although minimal) of PEM (see partial *r*'s in Table 17): social motives, $t(95) = 2.51$, $p<.01$; coping motives, $t(95) = 5.93$, $p<.001$, and enhancement motives, $t(95) = 6.59$, $p<.001$.

Table 17. Regression Tests of Mediational Hypotheses for PEM and DD Severity

Step	b	SE of b	β	R^2	Partial r	Semipartial r^2
Mediational Model #1						
Step 1: PEM predicting social motives	-.05	.05	-.11	.01		
Step 2: PEM predicting DD severity	.002	.07	.003	.00		
Step 3: PEM and social motives predicting DD severity				.06		
PEM	.02	.07	.03 [ns]		.03	.001
Social motives	.37	.15	.25**		.25	.06
Mediational Model #2						
Step 1: PEM predicting coping Motives	-.08	.06	-.15	.02		
Step 2: PEM predicting DD severity	.002	.07	.003	.00		
Step 3: PEM and coping motives predicting DD severity				.27		
PEM	.06	.06	.08 [ns]		.09	.006
Coping motives	.68	.11	.53***		.52	.27
Mediational Model #3						
Step 1: PEM predicting enhancement Motives	-.02	.05	-.05	.00		
Step 2: PEM predicting DD severity	.002	.07	.003	.00		
Step 3: PEM and enhancement motives predicting DD severity				.31		
PEM	.02	.06	.03 [ns]		.04	.001
Enhancement motives	.78	.12	.56***		.56	.31

Note. Symbols indicating significant and nonsignificant results are only provided for those statistics that correspond to the criteria necessary to establish mediation; $^{\dagger}p<.10$; $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.
DD = Drug dependence symptom severity.
b is unstandardized beta; SE = Standard error of unstandardized beta; β = Standardized beta.
[m]Mediational model supported.
[ns]Mediational model not supported.

Figure 11. Path Diagram of PEM, Social Motives, and DD Severity Mediation

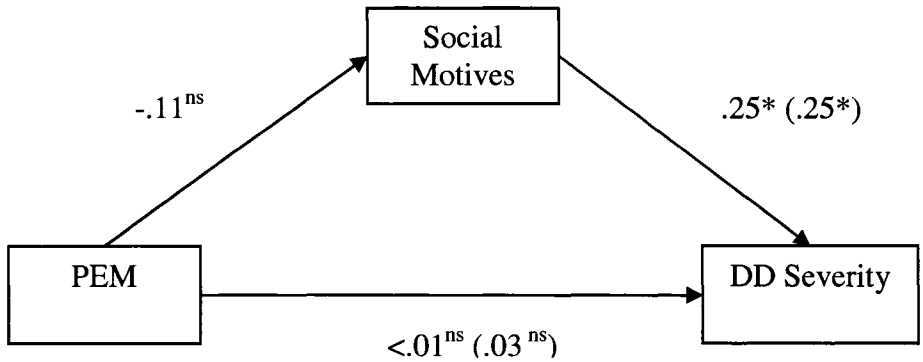


Figure 12. Path Diagram of PEM, Coping Motives, and DD Severity Mediation

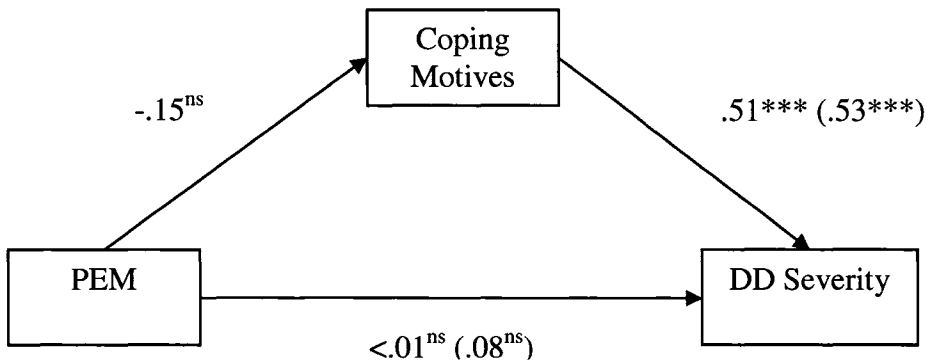
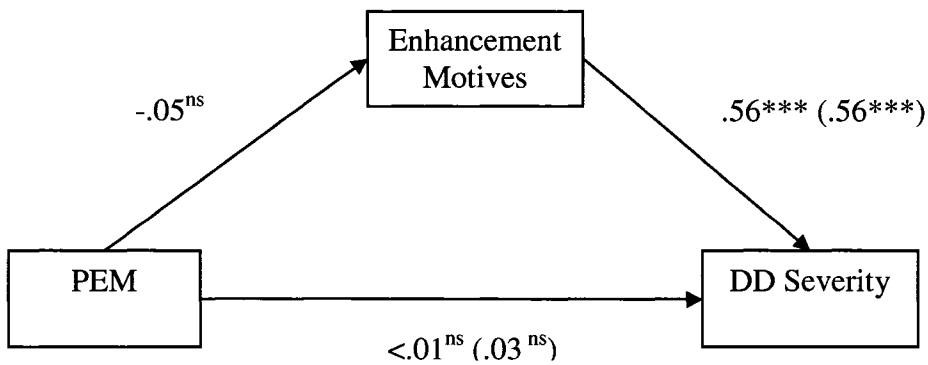


Figure 13. Path Diagram of PEM, Enhancement Motives, and DD Severity Mediation



Note. For all Figures: DD = Drug Dependence; †p<.10; **p*<.05; ***p*<.01; ****p*<.001.

Consistent with the results obtained for the mediational analyses for NEM and alcohol dependence severity, both coping and enhancement motives were found to mediate the relationship between NEM and the severity of drug dependence symptoms reported (see Table 18 and Figures 14 and 15). Once again, social motives did not serve to mediate this association (see Figure 16).

Table 18. Regression Tests of Mediational Hypotheses for NEM and DD Severity

Step	b	SE of b	β	R^2	Partial r	Semipartial r^2
Mediational Model #1						
Step 1: NEM predicting social motives	.09	.06	.16	.03		
Step 2: NEM predicting DD severity	.28	.08	.35***	.13		
Step 3: NEM and social motives predicting DD severity				.16		
NEM	.26	.08	.32 [ns]		.33	.10
Social motives	.29	.14	.20*		.21	.04
Mediational Model #2						
Step 1: NEM predicting coping motives	.23	.06	.37***	.14		
Step 2: NEM predicting DD severity	.28	.08	.35***	.13		
Step 3: NEM and coping motives predicting DD severity				.29		
NEM	.15	.07	.19 [m]		.20	.03
Coping motives	.57	.12	.44***		.44	.17
Mediational Model #3						
Step 1: NEM predicting enhancement motives[1]	357.29	172.44	.21*	.04		
Step 2: NEM predicting DD severity	.28	.08	.35***	.13		
Step 3: NEM and enhancement motives predicting DD severity				.33		
NEM	.20	.07	.26 [m]		.29	.06
Enhancement motives	.00	.00	.47***		.49	.21

Note. Symbols indicating significant and nonsignificant results are only provided for those statistics that correspond to the criteria necessary to establish mediation; $^{\dagger}p<.10$; $*p<.05$; $**p<.01$; $***p<.001$.
DD = Drug dependence symptom severity.
[1]Enhancement motives represent transformed scores for NEM-related analyses.
b is unstandardized beta; SE = Standard error of unstandardized beta; β = Standardized beta.
[m]Mediational model supported.
[ns]Mediational model not supported.

Figure 14. Path Diagram of NEM, Coping Motives, and DD Severity Mediation

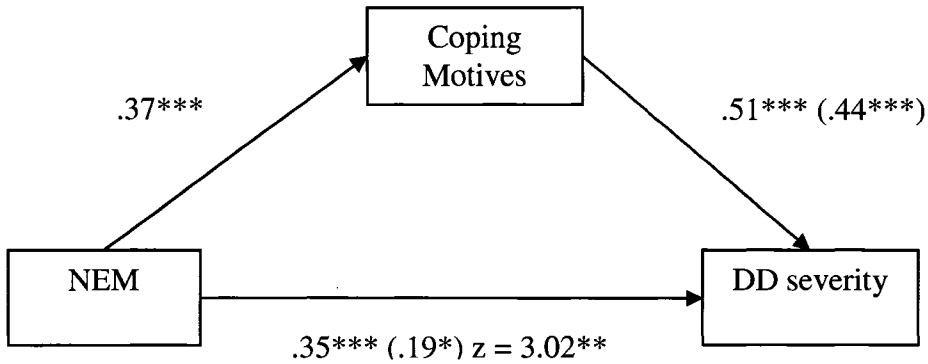


Figure 15. Path Diagram of NEM, Enhancement Motives, and DD Severity Mediation

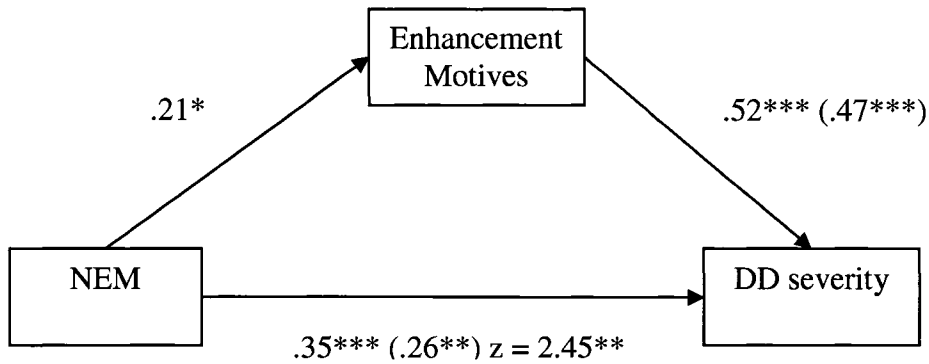
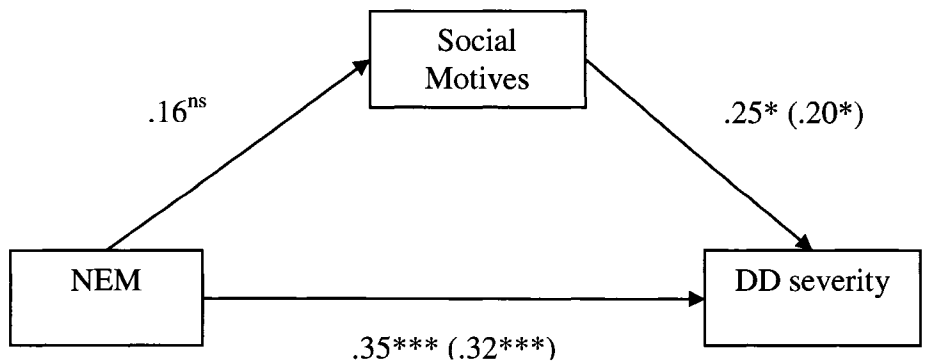


Figure 16. Path Diagram of NEM, Social Motives, and DD Severity Mediation



Note. For all Figures: ^{ns}Not significant; $^{\dagger}p<.10$;$^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.

As is clearly illustrated by the above figures, elevated levels of NEM led to an over-reliance on coping and enhancement motives for using substances, with such motives resulting in an increased likelihood of presenting with more severe symptoms of drug dependence. In the case of coping motives, such motives accounted for nearly half (i.e., 47%) of the effect of NEM on drug dependence severity, while the report of using substances to enhance pleasurable states accounted for approximately 38%. These results suggest that coping motives may be a particularly potent mediator among offenders plagued by negative affective states. In contrast, social motives did not mediate the relationship between NEM and drug dependence severity as such motives were not related to this dispositional style.

Also in line with the results obtained for the CON and alcohol dependence mediator analyses, coping motives revealed a trend toward partial mediation of the CON → drug dependence severity relationship, explaining nearly half (i.e., 49%) of the reduced association in the present case when it was introduced into the model (see Table 19 and Figure 17). In contrast to the failure to find a significant reduction in the strength of the association between CON and substance use severity when the outcome variable was alcohol dependence, when enhancement motives were entered into the model and drug abuse was the outcome of interest, the reduction was highly significant, with enhancement motives accounting for 69% of CON's effect on the dependent variable (see Figure 18). Social motives, once again, did not mediate this relationship (see Figure 19).

Table 19. Regression Tests of Mediational Hypotheses for CON and DD Severity

Step	b	SE of b	β	R^2	Partial r	Semipartial r^2
Mediational Model #1						
Step 1: CON predicting social motives	-.08	.08	-.10	.01		
Step 2: CON predicting DD severity	-.22	.12	-.18†	.03		
Step 3: CON and social motives predicting DD severity				.09		
CON	-.19	.12	-.16[ns]		-.17	.03
Social motives	.34	.14	.23*		.24	.05
Mediational Model # 2						
Step 1: CON predicting coping motives	-.17	.09	-.18†	.03		
Step 2: CON predicting DD severity	-.22	.12	-.18†	.03		
Step 3: CON and coping motives predicting DD severity				.27		
CON	-.11	.11	-.09[m]		-.11	.01
Coping motives	.64	.11	.50***		.50	.24
Mediational Model #3						
Step 1: CON predicting enhancement motives	-.20	.09	-.23*	.05		
Step 2: CON predicting DD severity	-.22	.12	-.18†	.03		
Step 3: CON and enhancement motives predicting DD severity				.32		
CON	-.07	.11	-.06[m]		-.07	.003
Enhancement motives	.76	.12	.55***		.54	.28

Note. Symbols indicating significant and nonsignificant results are only provided for those statistics that correspond to the criteria necessary to establish mediation; †$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$.
DD = Drug dependence symptom severity.
b is unstandardized beta; SE = Standard error of unstandardized beta; β = Standardized beta.
[m]Mediational model supported.
[ns]Mediational model not supported.

Figure 17. Path Diagram of CON, Coping Motives, and DD Severity Mediation

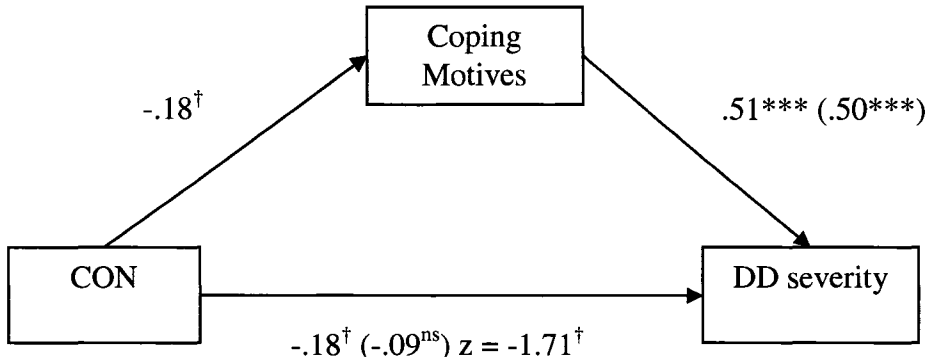


Figure 18. Path Diagram of CON, Enhancement Motives, and DD Severity Mediation

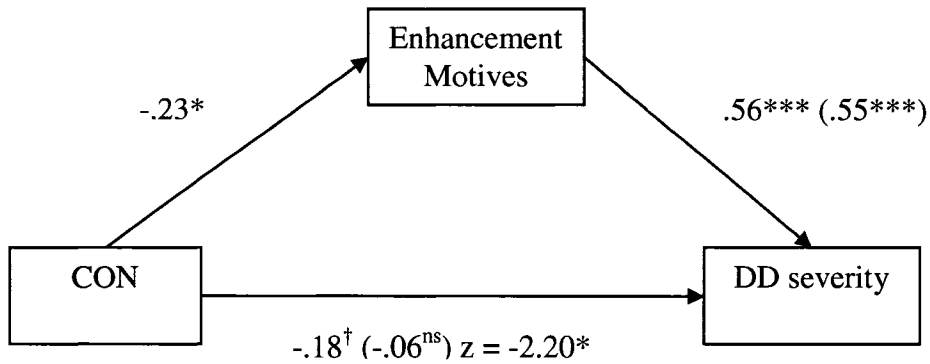
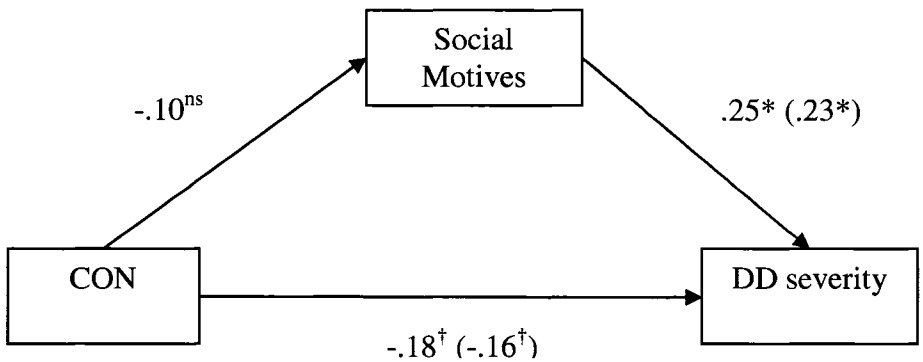


Figure 19. Path Diagram of CON, Social Motives, and DD Severity Mediation



Note. For all Figures: ^{ns}Not significant; $^{\dagger}p<.10$; $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$.

Discussion

Overview

In recent years, several studies have documented offenders to be a particularly vulnerable population when it comes to the development of substance use disorders (CSC, 2001; Weekes, 2002; Weekes et al., 1999). In Canada, approximately 50% of prisoners housed in federal correctional facilities have an identified alcohol problem, and a comparable proportion report difficulties associated with other drugs (Weekes et al., 1999). The severity of substance dependence manifest among offenders exhibits considerable variation (Kunic & Grant, 2005; Robinson et al., 1991; Weekes et al., 1999), however, a finding that was underscored in the present investigation. Indeed, this study found that the vast majority of offenders fell within the lower severity ranges for symptoms related to alcohol abuse, whereas considerably more fell within the higher severity ranges when drug dependence was examined. These findings resulted in far fewer participants meeting the diagnostic criteria for an AUD relative to DUDs (i.e., 4% vs. 42%, respectively). Such wide variation in the severity of symptoms manifest has a number of important implications, including the length and intensity of treatment delivered, as well as the techniques and modalities applied (Delnef, 2001; Eno, Long, Blanchet, Hansen, & Dine, 2001; Kunic & Grant, 2005; Serin & Cousineau, 2001). These findings, coupled with the robust links between the severity of substance abuse problems and both recidivism and custodial readmission rates (Brochu, Cousineau, Gillet, Cournoyer, Pernanen, & Motiuk, 2000; Weekes et al., 1999), emphasize the importance of gaining a better understanding of those factors that may contribute to the development and maintenance of substance-related problems among offenders, an area that has not

been adequately addressed in the academic arena to date. Based on the clinical literature examining pathways to substance abuse among members of the general population, two key factors, personality and motives for substance use, have emerged as prominent risk factors for substance abuse (e.g., Iacono et al., 1999; Verheul & van den Brink, 2000). This study sought to extend this line of inquiry to a correctional sample.

Personality Profile of Offenders with Identified Substance Abuse Needs: A Dimensional Approach to Assessment

Personality traits continue to hold a central place in etiological theories of substance abuse (e.g., Caspi et al., 1997; Sher & Trull, 1994; Verheul & van den Brink, 2000) and, although several influential models have been developed and are espoused to have strong potential for systematically organizing findings on personality and substance abuse (e.g., see Sher & Trull, 1994), relatively few studies have applied these models in order to acquire a better understanding of substance abuse among offenders. In addressing this gap, the present investigation focused on one of the most prominent three-factor models – the personality system proposed by Tellegen (1985) – due to its remarkable convergence with contemporary pathway models seeking to explain the development of substance-related problems (e.g., Verheul & van den Brink, 2000), as well as the paucity of research applying this classification scheme to correctional samples. Using a theoretically derived assessment instrument holds considerable potential for providing a richer understanding of offenders' full repertoire of traits, the absence of which typifies much of the research on the personality traits characteristic of offenders to date (e.g., Bergeron & Valliant, 2001; Longato-Stadler et al., 2002).

As elaborated upon in the introduction, offenders, as a group, are frequently characterized as highly impulsive individuals who tend to be adventuresome, reckless, and thrill-seeking by nature (Bergeron & Valliant, 2001; Longato-Stadler et al., 2002). Many have also been reported to display negative emotional states and to be particularly prone to experiencing anxiety, irritability, hostility, and aggression (Bergeron & Valliant, 2001; Longato-Stadler et al., 2002). These findings were confirmed in this study using Tellegen's (1985) three-factor model of personality, and provide convergent support for the personality profile noted amongst individuals with substance abuse problems (Chassin et al., 2004; Krueger, 1999; Mulder, 2002; Sher et al., 2000). Compared to published norms for a non-offender sample (Patrick et al., 2002), offenders in this investigation were found to present with notably lower levels of constraint (CON) and higher levels of negative emotionality (NEM). These findings suggest that offenders were more impulsive, enjoyed engaging in risky behaviours, and endorsed fewer traditional values (i.e., low CON), relative to the general population, and that they also reported higher levels of anxiety, nervousness, irritability, and aggressiveness (i.e., high NEM) compared to the reference group. Interestingly, although it was anticipated that offenders would report lower levels of PEM given the anticipated inverse association between PEM and NEM, this was not found to be the case as both samples were remarkably similar on this dimension. As such, overall, offenders were no more or less likely to characterize themselves as experiencing positive emotions than were members of the general public. However, a closer examination of the traits that comprise this higher-order factor did reveal that offenders scored significantly lower on the subscales measuring traits consistent with general satisfaction with their lives and their tendency to seek emotionally

intimate relationships, relative to non-offenders. In contrast, offenders were more likely to perceive themselves to be high achievers and to enjoy challenging tasks. Finally, both offenders and non-offenders were found to display comparably moderate facility when it came to their imaginative and creative abilities as assessed by the Absorption scale.

Beyond documenting the personality profile of the study sample, central to this thesis were the associations between each of the higher-order traits described above and the severity of substance dependence symptoms, with particular interest centering upon their degree of specificity according to the type of substance being abused (i.e., alcohol versus drugs). These questions were addressed by examining the relationships between the personality factors and the severity of symptoms of alcohol and drug dependence both before (i.e., hypothesis 2) and after statistically controlling for the other type of substance dependence severity scores (i.e., hypothesis 3). From these analyses, several interesting findings emerged that provided insight into the personality – substance abuse relationship. They further allowed several important conclusions regarding this relationship to be drawn. Most significantly, the results indicated that there is indeed a robust association between personality and the severity of substance abuse; however, this relationship may differ somewhat depending upon the type of substance being examined. In particular, providing partial support for the second hypothesis, NEM and CON emerged as the strongest correlates of substance abuse severity, but this was only the case when it came to the severity of *drug* dependence symptoms reported, and it was only with the former personality dimension that this relationship achieved statistical significance. By comparison, PEM was unrelated to the severity of drug dependence. Diverging from predictions were the strength of the associations between each of the higher-order traits

and the severity of *alcohol* dependence symptoms reported, with each of the dimensions revealing nearly identical (and modest) associations with this severity index. Taken together, these findings indicate that more severe symptoms of drug dependence are primarily associated with elevated levels of NEM, thereby suggesting that offenders who abuse drugs tend to be untrusting and plagued by feelings of anxiety, worry, tension, and irritability. In contrast, more severe symptoms of alcohol abuse appear to be associated not only with higher levels of NEM, but also with notably lower levels of both PEM and CON. Therefore, in addition to being irritable and moody, offenders with more severe alcohol abuse symptoms are less likely to be satisfied with their lives, report fewer feelings of wellbeing, and also display higher levels of impulsivity and risk-taking behaviours, relative to those with fewer alcohol-related problems.

Thus, these results suggest that some degree of specificity may exist between the type of substance abuse in question and their personality correlates. This contention received partial support when the *unique* associations between alcohol and drug dependence severity and the higher-order personality dimensions were examined, while simultaneously controlling for the other type of substance abuse. In particular, these analyses confirmed the specificity of PEM to the severity of alcohol dependence symptoms as PEM remained significantly associated with this variable, even after controlling for any of the variance accounted for by concurrent drug dependence symptoms. As noted above, PEM was unrelated to the severity of drug dependence reported, and this remained the case in the specificity analyses when the variance accounted for by concurrent alcohol abuse symptoms was partialled out.

Upon examining the unique associations between alcohol and drug dependence severity and NEM, even though both indices of substance abuse accounted for incremental variance in NEM when the other was controlled for, the proportion of unique variance accounted for by *drug* dependence symptom severity was greater than that obtained for alcohol dependence (i.e., 8% vs. 5%), with all other factors in the model held constant. Therefore, in contrast to what was hypothesized, these findings suggest that NEM may, in fact, be somewhat *more* influential with regards to the development of drug dependence as compared to alcohol abuse. Also unexpected were the findings achieved for CON. In this regard, CON exhibited some specificity with alcohol abuse scores, but not with symptoms of drug dependence as had been anticipated. In the present case, only the severity of alcohol dependence symptoms was found to account for significant unique variability in CON when other substance abuse symptoms were controlled for. These findings run counter to those obtained in another investigation addressing the issue of specificity (i.e., McGue et al., 1999), where the authors found that NEM was primarily associated with alcohol use disorders when concurrent drug use was controlled for, whereas CON was specifically associated with drug use disorders when alcohol use was held constant. PEM was not significantly associated with either type of substance use disorder. However, the contradictory results between those obtained in this study and those reported by McGue et al. may be due to several factors, with perhaps the most salient being that McGue and associates researched substance use *disorders*, whereas this study addressed substance abuse *severity*. It is plausible that the personality correlates of the severity of substance dependence symptoms differ from those characteristic of individuals with diagnosable SUDs. Furthermore, since their research involved a

community-based sample, it is difficult to ascertain whether the observed differences are due to more general differences in sample characteristics (e.g., antisociality) and less related to the indices of substance abuse studied. Nonetheless, the present results are in line with several more recent investigations that have examined the relationship between personality and alcohol and drug abuse using a variety of indices, including disorders. These studies have generally confirmed that NEM is a weaker predictor of alcohol abuse than are measures of behavioural undercontrol (Flory et al., 2002; Sher et al., 2000), and that individuals presenting with more severe forms of drug dependence may actually show higher levels of NEM relative to those with symptoms consistent with alcohol dependence (Chassin et al., 2004). From one of the few available studies that have used an offender sample, higher levels of NEM were also reported to be a particularly important risk factor when it came to predicting problematic drug usage (Lyons et al., 1998).

The final personality dimension addressed in the specificity analyses, Absorption, was found not to be specific to either type of substance dependence symptoms which is, perhaps, not surprising given that this personality factor was not significantly correlated with alcohol or drug dependence in the analyses for the second hypothesis. Thus, offenders who revealed problems related to alcohol appear to be no more or less imaginative and open to novel experiences and sensations than offenders with drug-related problems. Although Flory and colleagues (2002) found a similar personality construct (i.e., Openness to Experience) to be elevated among drug abusers, unlike Openness to Experience, Absorption is not confounded with such attributes as liberalism – traditionalism (Glisky et al., 1991) and, consequently, it may be tapping a more pure

trait than Openness. Once again, however, direct comparisons between the studies are compromised by differences in the samples examined (i.e., community-based vs. offenders). Hence, it will be important to replicate the present findings on another group of offenders with identified substance abuse needs.

In summary, despite the inconsistencies surrounding the issue of specificity documented in the literature, as an aggregate, it appears that personality correlates across substances being abused are more similar than they are different. In particular, high NEM and low levels of CON appear to characterize most forms of substance abuse (Elkins, King, McGue, & Iacono, 2006; Sher et al., 1999; Trull et al., 2004). This conclusion received support in this investigation in that both alcohol and drug dependence severity accounted for unique variability in NEM and, although only alcohol severity accounted for significant unique variance in CON, drug dependence did exhibit a trend toward significance in this regard. As such, both elevated levels of NEM and depressed levels of CON may pose a more generalized risk for substance abuse problems, and it appears that this applies to both offender and non-offender populations.

Motives as a Mediator

In addition to documenting a direct association between the theoretically derived and empirically informed MPQ personality dimensions and substance abuse among offenders, perhaps the most noteworthy contribution of this investigation were the results gleaned from the mediational analyses. Prior to this study, few researchers had moved beyond examining the personality correlates of substance abuse to exploring potential mechanisms through which personality may come to influence problematic substance usage. Nevertheless, there is a growing body of research suggesting that an individual's

motives for substance use are strongly related to various indices of substance use (Cooper et al., 1992; Carpenter & Hasin, 1998; Henderson & Galen, 2003), and that an intricate association may exist between personality and these motives (Cooper et al., 1995; Goldstein et al., 2000; Sher & Trull, 1994; Verheul & van den Brink, 2000).

While the examination of individuals' motives for substance use remains in its infancy, as noted previously, the literature suggests that coping motives may be the most robust predictor of substance abuse (Cooper et al., 1992; Carpenter & Hasin, 1998). Despite the fact that this research has largely been confined to the study of alcohol abuse, one recent investigation purports that these findings may generalize to other drugs as well (Wills et al., 1999), a finding confirmed in the present investigation. More specifically, offenders who exhibited an over-reliance on these motives reported more severe symptoms of both alcohol and drug abuse, with the magnitude of this association being comparable for both substances (i.e., $r = .41$ and $r = .51$, respectively). Another notable finding from this study was that each type of motive was found to be significantly correlated with both alcohol and drug dependence severity scores, indicating that they are influential in the severity of symptoms presented across substances of abuse. Interestingly, a comparison of the strength of the (zero-order) correlations between social motives and each index of substance abuse revealed that social motives were much more strongly associated with the severity of alcohol dependence symptoms relative to drug dependence, accounting for nearly four times the variability in alcohol abuse severity scores (i.e., 23% vs. 6%, respectively). In contrast, the reverse was evident for enhancement motives which accounted for nearly five times the variance in *drug* dependence severity scores relative to alcohol dependence severity (i.e., 31% vs. 6%,

respectively). As an aggregate, these results suggest that while coping motives may serve as moderately strong indicators of problematic substance usage in general, social motives may be particularly influential when it comes to predicting the severity of alcohol abuse, whereas enhancement motives may be particularly predictive of drug-related problems.

Research that has gone one step further and examined the association between personality and motives for substance use in the general population has shown that NEM-related traits are most strongly related to coping motives (Cooper et al., 1995; Goldstein et al., 2000; Sher & Trull, 1994), and that a potential association, though considerably weaker, exists between PEM and enhancement motives (Cooper et al., 1995). Constructs similar to CON (e.g., sensation-seeking) have been found to be moderately associated with both coping and enhancement motives (Cooper et al., 1995). In line with these findings, as well as the initial hypotheses put forward, the present study showed that elevated levels of NEM were *most* strongly correlated with coping motives for substance use, and lower levels of CON (i.e., higher levels of impulsivity) revealed the *greatest* association with enhancement motives. Unexpectedly, higher levels of NEM were also significantly associated with enhancement motives, but to a lesser degree than its association with coping motives. Likewise, lower CON scores were also related to coping motives, but only a trend toward significance was achieved in this regard. Similar patterns have been noted elsewhere (e.g., Loukas et al., 2000). In contrast to predictions, PEM was not significantly related to any of the motives for substance use, including social motives as had been previously reported with non-offenders (Cooper et al., 1995).

Taken together, the results obtained in the correlational and specificity analyses established a direct linkage between personality and substance dependence severity. This,

in conjunction with the above findings underscoring the intricate association between personality and motives, and motives themselves and substance abuse, indicates that a sound foundation exists for postulating that motives may serve to mediate the personality → substance abuse relationship. This supposition was supported in this study for several of the mediational models involving NEM and CON. In line with prior research using both community-based (Cooper et al., 1995; Loukas et al., 2000; Wills et al., 1999) and offender samples (Lyons et al., 1998; Reardon et al., 2002), coping motives were undoubtedly a potent mediator of the association between NEM and substance abuse, a finding that held true regardless of whether the outcome of interest was the severity of alcohol or drug dependence symptoms reported. In the case of alcohol abuse severity, coping motives accounted for approximately 65% of its association with NEM, and for nearly 50% of the relationship between NEM and drug abuse severity. These findings suggest that offenders plagued by high levels of tension, distress, anxiety, and irritability tend to be more likely to report using substances to reduce these negative emotional states which, in turn, increases their likelihood of presenting with more severe alcohol and drug dependence symptoms. Since coping motives were also found to display trends towards partially mediating the association between CON and both alcohol and drug dependence severity, accounting for roughly 26% and 21% of their relationships, respectively, this shows that highly impulsive offenders may also tend to rely on coping motives, and that an over-reliance on such motives leads to more severe substance abuse symptoms. However, as is evident, such motives only accounted for a modest degree of this latter predictor → outcome association. Indeed, the most potent mediator of the CON→ substance abuse effect was found to be enhancement motives, and this mediational

influence was limited to *drug* dependence severity. In this case, enhancement motives accounted for nearly 70% of CON's effect on the severity of symptoms reported, and underlines that the primary mechanism through which highly impulsive, sensation-seeking offenders develop problems with drugs is through their tendency to seek to enhance pleasurable feelings and positive emotional states. It has previously been proposed that individuals who are low in CON may drink for enhancement purposes because they lack the appropriate inhibitory control over their substance use (Sher, 1997), because they minimize the potential risks associated with pursuing stimulating experiences (Watson, Clark, & Harkness, 1994), or because they wish to increase the positive affect associated with the rewarding pharmacological effects of alcohol (Levenson, Oyama, & Meek, 1987). The present findings suggest that such motives extend to and may, in fact, play a more prominent role in, offenders' reasons for using drugs as well.

In contrast to the mediational analyses for NEM and CON and, as would be expected, given the non-significant associations between PEM and any of the reasons reported for substance use, motives did not mediate the relationship between PEM and substance abuse. Instead, for this group of offenders, it appears that PEM exerted its effect on substance abuse severity directly, and only in the case of alcohol dependence as it was unrelated to the severity of drug dependence symptoms reported. Nevertheless, since PEM only accounted for a small portion of the variance in alcohol abuse scores, it is evident that other factors are implicated in problematic alcohol usage. If one examines the direct effect of the different types of motives on the severity of alcohol abuse reported, even after taking into account the proportion of variability in the outcome

measure accounted for by PEM (i.e., approximately 5%), it is clear that motives themselves may in fact be more influential in determining the degree of symptom severity, accounting for roughly 6% to 24% of the variance in alcohol dependence scores, depending on the motive in question. These findings are consistent with those reported by the only comparable study available (i.e., Cooper et al., 1995), as well as the more general body of research, suggesting that negative emotions have stronger motivational consequences than positive ones (see Cooper et al., 1995).

Thus, collectively, these findings highlight the significance of motives in understanding the relationship between personality traits and the severity of substance dependence among offenders, and further emphasize the importance of distinguishing between the predominant type of substance being abused. The interrelationships between personality and motives and their influence in determining both consumption patterns and the severity of substance abuse symptoms prior to this study have perhaps been most poignantly underscored by contemporary pathway models for substance abuse (e.g., Verheul & van den Brink, 2000), and several of the findings reported herein are consistent with such models. Although the results of this study cannot adequately address the etiological significance of personality and motives in the development of problematic substance use, they do provide convergent support for at least two of the three trajectories to substance abuse noted in the model developed by Verheul and van den Brink (2000). More specifically, the present results suggest that offenders appear to be particularly at risk for developing substance-related problems due to their elevated levels of impulsivity and risk-taking behaviours (i.e., low levels of CON). Such self-regulatory deficits led to an over-reliance on enhancement motives in an effort to increase positive affective states

which, in turn, increased their likelihood of manifesting more severe symptoms of substance dependence, at least when it came to the abuse of drugs. These findings provide support for the behavioural disinhibition pathway to substance abuse documented in previous research (Verheul & van den Brink, 2000). Another subgroup of offenders also appear to be especially vulnerable to developing substance abuse problems via the stress reduction pathway given that individuals who follow this trajectory tend to score high on measures of NEM and, as a result, use substances to cope with their negative affective states (Verheul & van den Brink, 2000). By comparison, offenders may be less likely to develop substance-related problems via the third reward sensitivity pathway given that PEM was not found to be associated with enhancement motives, which appears to be more characteristic of this route to addiction (Verheul & van den Brink, 2000). As will be discussed shortly, these findings hold considerable promise for treatment endeavours.

Strengths and Limitations

Before considering the strengths of this investigation, there are a number of limitations that must be borne in mind when interpreting the findings. First and foremost among these is the cross-sectional nature of the study. In the absence of a longitudinal design, it is not possible to ascertain whether maladaptive personality styles predate the onset of substance abuse or are merely artifacts of substance abuse that emerged over time. It is equally plausible that other variables unaccounted for in this research actually resulted in the personality scores obtained and the severity of substance abuse symptoms reported. Indeed, only one factor, offenders' motives for substance use, was examined as a potential mediator of the relationship between personality and the severity of substance

dependence reported. Therefore, longitudinal investigations will be necessary to disentangle the temporal proximity of personality in the pathogenesis of substance abuse, as well as the identification of additional factors that may intercede in this process.

Secondly, there was no control group included of offenders without substance-related problems. As such, it is not known whether substance abusing offenders present with a different personality profile relative to the general offender population. It may be that offenders, regardless of whether they have a substance abuse problem, exhibit a profile characterized by low levels of CON and elevated levels of NEM and, in actual fact, such characteristics have been known to typify offenders in general (Bergeron & Valliant, 2001; Longato-Stadler et al., 2002). Consequently, it will be important for future research to include a control group for comparison purposes.

Thirdly, this study only looked at male offenders. Therefore, the degree to which the personality profiles found, the prominent motives reported for substance use, and their relationships to specific types of substances of abuse are generalizeable to female offenders remains to be seen. Given the disproportionately high rates of substance abuse among women offenders relative to male offenders (McVie, 2001), as well as the growing recognition that there may be gender-specific risk factors and needs implicated in their development and maintenance (Blanchette, 2000; Borrill et al., 2003; Hume, 2004), these lines of inquiry will be important to address in the future.

A final limitation was the sole reliance on offenders' self-reports. Although a merit of the personality measure used is that it contains a built-in scale assessing social desirability, the responses to which revealed that virtually all response patterns for the present study on this inventory were valid, the veracity of offenders' statements with

regard to alcohol and drug usage is still unknown. A handful of offenders who participated in this investigation verbally voiced their concern that the indices of substance usage would be used to "diagnose" them and, as a result, they would be assigned to more intense treatment programs. Even though the researcher assured them that this would not be the case, whether their concerns influenced their responses to the substance use questionnaires cannot be ascertained. However, it is important to note that the social desirability index was inversely correlated with the substance use measures, suggesting that offenders with more severe symptoms of substance dependence actually displayed *lower* levels of socially desirable responding. While this latter finding indicates that offenders may not have been reluctant to disclose problems related to substance use, future designs could be enhanced, when possible, by recruiting friends and/or family to participate in the study as a means of corroborating their reports.

Despite these limitations, the present study has several noteworthy strengths. First, it is one of the few investigations to examine "normal" personality dimensions among offending populations using a multidimensional, validated system of personality. At a practical level, the use of a guiding theoretical framework has the potential to both inform program planning decisions (e.g., offender-treatment matching), as well as facilitate a greater appreciation of issues surrounding offenders' responsivity to correctional interventions. It also provides consistency in how a construct is measured, thereby allowing for more meaningful comparisons to be made across studies. A second strength is that, with but few exceptions, very little research to date has examined the mechanism through which personality may come to influence the development of substance-related problems (e.g., Loukas et al., 2000; Reardon et al., 2002), and the

sensitivity of various personality dimensions to particular types of substance abuse (e.g., McGue et al., 1999; Trull et al., 2004). In line with the limited inquiry in these areas, the results of the current investigation suggest, however, that such considerations may be invaluable in guiding treatment efforts. Indeed, the greatest merit of this research lies perhaps in the practical implications it holds for the design and implementation of correctional substance abuse treatment programs in the future.

Treatment Implications

Recognition of both the alarming prevalence of substance abuse problems among offenders, as well as the link between substance abuse and crime, has made targeting substance abuse a top priority in correctional programming initiatives since the late 1980s (Correctional Service of Canada [CSC], 1991; Delnef, 2001). A recent national survey shows that substance abuse programs are now offered in most correctional jurisdictions across Canada at both the federal and provincial levels, and that these programs either focus exclusively on substance abuse or are incorporated into a multi-need model (i.e., they target substance abuse alongside such problems as violent, domestic, and sexual offending) (Serin & Cousineau, 2001). While the predominant theoretical orientation across jurisdictions is cognitive-behavioural with an emphasis on relapse prevention, many other models are available, such as those that follow a psychodynamic, therapeutic community, spiritual, or 12-step approach (Serin & Cousineau, 2001). By and large, however, an examination of the admission criteria across programs reveals that none considers personality in aiding treatment decisions. The results of this study nevertheless suggest that the substance abuse treatment delivery system could potentially be enhanced by considering offenders' dispositional characteristics. Although the relative stability of

personality traits by adulthood has long been a hotly debated topic, the empirical evidence to date indicates that the balance is tipped in favour of dispositional stability (McCrae & Costa, 1990; Roberts & DelVecchio, 2000; Terracciano, Costa, & McCrae, 2006). As such, rather than attempt to change offenders' personality style in an effort to influence substance abuse outcome, it may be more fruitful for clinicians to use their personality as a guide to program assignment, the intervention strategies selected, or as a matching factor to the therapist's own interaction style or characteristics. Such offender-treatment and offender-therapist matching lie at the core of the principle of responsivity, one of the fundamental principles underlying effective correctional programming (Andrews & Bonta, 2003), and inadequate attention to this principle may partially explain the only modest effect sizes obtained to date regarding the efficacy of substance abuse treatment programs (Corrigan, 1991; Dowden & Brown, 2002; Lipton, Pearson, Cleland, & Yee, 2002; Porporino, Robinson, Millson, & Weekes, 2002; T^3 Associates, 1999). That is, the failure to consider personality may actually be attenuating program effectiveness, whereas a greater appreciation of offenders' personality styles may, in fact, lead to enhanced treatment success. A growing body of research on non-offenders with SUDs suggests that personality dimensions influence treatment outcome (Bottlender & Soyka, 2005; Ciraulo, Piechniczek-Buczek, & Iscan, 2003; Fisher, Elias, & Ritz, 1998), and that matching practices hold considerable promise in reducing both the frequency and severity of problematic alcohol and drug usage (e.g., Conrod, Stewart, Pihl, Côté, Fontaine, & Dongier, 2000; Piedmont & Ciarrocchi, 1999). Given that substance abuse is now recognized to be a key criminogenic factor that is highly predictive of recidivism (Andrews & Bonta, 2003), it is imperative that such efforts be extended to offenders in

order to improve their chances of success, both in terms of symptom reduction and a reduced likelihood of re-offending upon release into the community.

Similar to personality, this study has highlighted that it is equally important that offenders' motives be considered in the treatment process as they provide a direct link to understanding why these individuals are abusing drugs or alcohol. However, unlike offenders' dispositional characteristics, motives for substance use may be more amenable to change over the course of treatment as has been found to be the case for substance-related expectancies (Brown, Carrello, Vik, & Porter, 1998) which are, themselves, intricately related to their motives for substance use (Cooper et al., 1995; Galen et al., 2001). Thus, a careful analysis of offenders' motives could be informative not only for treatment matching purposes or in guiding the selection of techniques most likely to reduce problematic substance use, but could also be the target of direct intervention. As mentioned above, a large body of literature has documented pervasive problem-solving skill and impulse control deficits among offenders (Antonowicz & Ross, 2004; Motiuk & Vuong, 2004; Ross & Ross, 1995), as well as elevated levels of distress and anxiety (Bergeron & Valliant, 2001; Longato-Stadler et al., 2002). Combined with the present findings that these offenders are most likely to report using substances to enhance pleasurable mood states or to cope with negative affect, teaching offenders to recognize why they are turning to drugs or alcohol to deal with their problems, and how they may better cope with their emotions and stressful situations, will be of utmost importance for these individuals. For instance, interventions targeting these motives could include anger management, relaxation strategies, and assertiveness training. Finding substance-free ways to enhance pleasure and excitement would be equally important to address.

Approaches that could potentially help in this regard would be to teach more effective self-regulatory skills and to provide alternative sources of pleasurable stimulation. As noted by Cooper and colleagues (1995), cognitive restructuring techniques directed toward altering expectancies for alcohol's enhancing effect could also prove successful as enhancers. Recent research on the effectiveness of Canadian correctional substance abuse treatment programs has highlighted the utility of incorporating many of these techniques in rehabilitative endeavours (T^3 Associates, 1999).

Directions for Future Research

Notwithstanding the necessity to replicate the findings from this investigation with another sample of male offenders, as noted previously, future research needs to examine the personality profile of female offenders using Tellegen's model, as well as their motives for using substances and the interrelationships between these variables. Longitudinal designs remain particularly relevant for unraveling the temporal order and role of personality in the development of problems related to substance abuse, and will be most informative for furthering the development of pathway models specific to offending populations. The specificity of personality dimensions and motives to different classes of drugs (e.g., psychostimulants vs. central nervous system depressants) would also take the present research one step further, and would shed light on areas relatively untouched in the academic literature. Perhaps one of the most worthwhile lines of inquiry lies in matching various offender profiles according to different treatment programs, techniques, and therapist characteristics or interaction styles. Preliminary research on non-offenders with SUDs suggests that this area holds considerable promise in improving treatment

outcome (Conrod et al., 2000; Piedmont & Ciarrocchi, 1999), and the results of this investigation provides a sound basis for extending such practices to offenders.

Conclusion

In summary, individual difference factors are increasingly being drawn upon by researchers from diverse disciplines in an effort to expand our understanding of the differential trajectories leading to addictive disorders. The importance of extending such lines of inquiry to incarcerated populations is underscored by the high prevalence rates of substance abuse among offenders and the considerable variation in the severity of their symptoms. The results of the present investigation highlighted that drug abuse may be a particularly prominent form of substance abuse in need of addressing in treatment programs, and that different personality traits and motives may serve to more effectively guide treatment efforts in the future. Improved mechanisms for targeting substance abuse remain a key endeavour for program administrators not only in an effort to promote the health and safety of offenders, fellow inmates and staff, but also in facilitating the eventual reintegration of offenders into society. It is anticipated that with further research surrounding the predictive utility of individual difference factors in the pathogenesis of substance abuse among this at-risk population, great strides will be made in the development of pathway models that could inform prison substance abuse treatment efforts and, ultimately, reduce the likelihood of recidivism upon offenders' release into the community.

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Appendix A: Background Information Form

Background Information Form

1. Identifying Information

1.1 Offender's ID #: _____

1.2 Offender's Date of Birth (yyyy/mm/dd): _____

2. Demographic Information

2.1 Offender's age **at the time of study**: _____

2.2 Offender's **current** marital status (please check):

Married/Common Law _____
Unmarried (widowed, divorced, single) _____
Unknown _____

2.3 Offender's race/ethnicity (please check):

Caucasian _____
Aboriginal _____
Black _____
Asian
Other _____

2.4 Highest level (i.e., grade) of education **at intake**: _____

3. Offense-Related Information

3.1 Type of offense(s) the individual is **currently** serving time for (e.g., sexual offense, drug-related offense, etc): _____

3.2 Length of original sentence assigned for current offense(s): _____

4. Treatment Participation

4.1 Length of time in **substance abuse treatment** program (in days): _____

Appendix B: Multidimensional Questionnaire - Brief Form

Multidimensional Personality Questionnaire
Brief Form

Auke Tellegen, Ph.D.

In this booklet, you will find a series of statements a person might use to describe her/his attitudes, opinions, interests, and other characteristics.

Each statement is followed by two choices, lettered (A) and (B) in the booklet. Read the statement and decide which choice best describes you. Then mark your answer on the answer sheet.

In marking your answers on the answer sheet, be sure that the number of the statement in the booklet is the same as the number on the answer sheet.

Please answer every statement, even if you are not completely sure which answer is right for you.

Read each statement carefully, but don't spend too much time deciding on the answer. Please try to answer ALL questions but there is no penalty should you choose not to.

1. It is easy for me to become enthusiastic about things I am doing. (A) True (B) False

2. I am quite effective at talking people into things.
(A) True (B) False

3. Some people say that I put my work ahead of too many other things.
(A) True (B) False

4. I have occasionally felt discouraged about something.
(A) True (B) False

5. I usually like to spend my free time with friends rather than alone.
(A) True (B) False

6. Often I get irritated at little annoyances.
(A) True (B) False

7. Many people try to push me around. (A) True (B) False

8. Often when I get angry I am ready to hit someone.
(A) True (B) False

9. I like to stop and think things over before I do them.
(A) True (B) False

10. I am often nervous for no reason.
(A) True (B) False

11. I might enjoy riding in an open elevator to the top of a tall building under construction.
(A) True (B) False

12. I don't like to see religious authority overturned by so-called progress and logical reasoning.
(A) True (B) False

13. I can be deeply moved by a sunset. (A) True (B) False

14. My table manners are not always perfect.
(A) True (B) False

15. I enjoy being in the spotlight.
(A) True (B) False

16. I set very high standards for myself in my work.
(A) True (B) False

17. When I am unhappy about something, (A) I tend to seek the company of a friend,
(B) I prefer to be alone.

18. My mood often goes up and down. (A) True (B) False

19. I know that certain people would enjoy it if I got hurt.
(A) True (B) False

20. When someone hurts me, I try to get even.
(A) True (B) False

21. I am more likely to be fast and careless than to be slow and plodding.
(A) True (B) False

22. It might be fun and exciting to be in an earthquake.
(A) True (B) False

23. Strict discipline in the home would prevent much of the crime in our society.
(A) True (B) False

24. When listening to organ music or other powerful music, I sometimes feel as if I am being lifted into the air.
(A) True (B) False

25. I have always been extremely courageous in facing difficult situations.
(A) True (B) False

26. I often feel happy and satisfied for no particular reason.
(A) True (B) False

27. I often keep working on a problem even if I am very tired.
(A) True (B) False

28. I am usually happier when I am alone. (A) True (B) False

29. I suffer from nervousness.
(A) True (B) False

30. People often try to take advantage of me.
(A) True (B) False

31. I admit that I sometimes enjoy hurting someone physically.
(A) True (B) False

32. Basically I am a happy person.
(A) True (B) False

33. I often prefer to "play things by ear" rather than to plan ahead.
(A) True (B) False

34. Of these two situations I would dislike more:
(A) Having a pilot announce that the plane has engine trouble and it may be necessary to make an emergency landing,
(B) Working in the fields digging potatoes.

35. The best way to achieve a peaceful world is to improve people's morals.
(A) True (B) False

36. Sometimes thoughts and images come to me without any effort on my part.
(A) True (B) False

37. At times I have been envious of someone.
(A) True (B) False

38. I live a very interesting life.
(A) True (B) False

39. People find me forceful.
(A) True (B) False

40. I am a warm person rather than cool and distant.
(A) True (B) False

41. I often find myself worrying about something.
(A) True (B) False

42. People often say mean things about me.
(A) True (B) False

43. I see nothing wrong with stepping on people's toes a little if it is to my advantage.
(A) True (B) False

44. When faced with a decision I usually take time to consider and weigh all possibilities.
(A) True (B) False

45. I usually do not like to be a "follower." (A) True (B) False

46. I would enjoy trying to cross the ocean in a small but seaworthy sailboat.
(A) True (B) False

47. I am opposed to more censorship of books and movies because it would go against free speech.
(A) True (B) False

48. If I wish I can imagine (or daydream) some things so vividly that it's like watching a good movie or hearing a good story.
(A) True (B) False

49. My opinions are always completely reasonable.
(A) True (B) False

50. Every day I do some things that are fun.
(A) True (B) False

51. When I work with others, I like to take charge.
(A) True (B) False

52. People say that I drive myself hard. (A) True (B) False

53. I am too sensitive for my own good. (A) True (B) False

54. My "friends" have often betrayed me. (A) True (B) False

55. I enjoy a good brawl.
(A) True (B) False

56. I am very level-headed and usually have both feet on the ground. (A) True (B) False

57. Of these two situations I would dislike more:
(A) Having to walk around all day on a blistered foot,
(B) Sleeping out on a camping trip in an area where there are rattlesnakes.

58. It is a pretty unfeeling person who does not feel love and gratitude toward her/his parents.
(A) True (B) False

59. Sometimes I can change noise into music by the way I listen to it.
(A) True (B) False

60. If I have a humiliating experience I get over it very quickly.
(A) True (B) False

61. I have at times eaten too much.
(A) True (B) False

62. I usually find ways to liven up my day.
(A) True (B) False

63. In most social situations, I like to have someone else take the lead.
(A) True (B) False

64. I am not a terribly ambitious person. (A) True (B) False

65. I am more of a "loner" than most people.(A) True (B) False

66. I would be more successful if people did not make things difficult for me.
(A) True (B) False

67. Sometimes I hit people who have done something to deserve it.
(A) True (B) False

68. I almost never do anything reckless.
(A) True (B) False

69. Of the these two situations I would dislike more:
(A) Being out on a sailboat during a great storm at sea,
(B) Having to stay home every night for two weeks with a sick relative.

70. I would prefer to see:
(A) Stricter observance of major religious holidays,
(B) Greater acceptance of nontraditional families, like single-parent families

71. I can often somehow sense the presence of another person before I actually see or hear her/him.
(A) True (B) False

72. I have always been completely fair to others.
(A) True (B) False

73. People rarely try to take advantage of me.
(A) True (B) False

74. Most mornings the day ahead looks bright to me.
(A) True (B) False

75. I am very good at influencing people. (A) True (B) False

76. I enjoy putting in long hours.
(A) True (B) False

77. For me, one of the best experiences is the warm feeling of being in a group of good friends.
(A) True (B) False

78. Occasionally I have strong feelings (like anxiety or anger) without really knowing why.
(A) True (B) False

79. I would rather turn the other cheek than get even when someone treats me badly.
(A) True (B) False

80. I often act on the spur of the moment. (A) True (B) False

81. Of these two situations I would dislike more:
(A) Being at the circus when two lions suddenly get loose down in the ring,
(B) Bringing my whole family to the circus and then not being able to get in because a clerk sold me tickets for the wrong night.

82. Higher standards of conduct are what this country needs most.
(A) True (B) False

83. The sound of a voice can be so fascinating to me that I can just go on listening to it.
(A) True (B) False

84. I have at times been angry with someone.
(A) True (B) False

85. Most days I have moments of real fun or joy.
(A) True (B) False

86. I often act without thinking.
(A) True (B) False

87. When it is time to make decisions, others usually turn to me.
(A) True (B) False

88. I often keep working on a problem long after others would have given up.
(A) True (B) False

89. I prefer to work alone.
(A) True (B) False

90. Minor setbacks sometimes irritate me too much.
(A) True (B) False

91. People often just use me instead of treating me as a person.
(A) True (B) False

92. I don't like to start a project until I know exactly how to do it.
(A) True (B) False

93. Of these two situations I would dislike more:
(A) Riding a long stretch of rapids in a canoe,
(B) Waiting for someone who's late.

94. I am disgusted by dirty language.
(A) True (B) False

95. Some music reminds me of pictures or changing patterns of color.
(A) True (B) False

96. I always tell the entire truth.
(A) True (B) False

97. I often feel sort of lucky for no special reason.
(A) True (B) False

98. I do not like to be the center of attention on social occasions.
(A) True (B) False

99. I work just hard enough to get by without overdoing it.
(A) True (B) False

100. I have few or no close friends.
(A) True (B) False

101. I sometimes get very upset and tense as I think of the day's events.
(A) True (B) False

102. Some people are against me for no good reason.
(A) True (B) False

103. I can't help but enjoy it when someone I dislike makes a fool of herself/himself.
(A) True (B) False

104. I seldom feel really happy.
(A) True (B) False

105. Of these two situations I would dislike more:
(A) Being chosen as the "target" for a knife-throwing act,
(B) Being sick to my stomach for 24 hours.

106. No decent person could ever think of hurting a close friend or relative.
(A) True (B) False

107. I can so completely wander off into my own thoughts while doing a routine task that I actually forget that I am doing the task and then find a few minutes later that I have finished it.
(A) True (B) False

108. Sometimes I'm a bit lazy.
(A) True (B) False

109. Every day interesting and exciting things happen to me.
(A) True (B) False

110. I am quite good at convincing others to see things my way.
(A) True (B) False

111. I push myself to my limits.
(A) True (B) False

112. I am happiest when I am with people most of the time.
(A) True (B) False

113. I am often troubled by guilt feelings. (A) True (B) False

114. I know that people have spread false rumors about me on purpose.
(A) True (B) False

115. I like to watch a good, vicious fight. (A) True (B) False

116. Before I get into a new situation I like to find out what to expect from it.
(A) True (B) False

117. I perform for an audience whenever I can.
(A) True (B) False

118. I am not at all sorry to see many of the traditional values change.
(A) True (B) False

119. I can sometimes recall certain past experiences in my life so clearly and vividly that it is like living them again, or almost so.
(A) True (B) False

120. Never in my whole life have I taken advantage of anyone.
(A) True (B) False

121. In my spare time I usually find something interesting to do.
(A) True (B) False

122. In social situations I usually allow others to dominate the conversation.
(A) True (B) False

123. I like to try difficult things.
(A) True (B) False

124. I prefer not to "open up" too much, not even to friends.
(A) True (B) False

125. My mood sometimes changes from happy to sad, or sad to happy, without good reason.
(A) True (B) False

126. I have often been lied to.
(A) True (B) False

127. Sometimes I just like to hit someone. (A) True (B) False

128. I am a cautious person.
(A) True (B) False

129. Of these two situations I would dislike more:
(A) Being in a flood,
(B) Carrying a ton of bricks from the backyard into the basement.

130. At times I somehow feel the presence of someone who is not physically there.
(A) True (B) False

131. I have sometimes felt slightly hesitant about helping someone who asked me to.
(A) True (B) False

132. My feelings are hurt rather easily.
(A) True (B) False

133. For me life is a great adventure.
(A) True (B) False

134. I do not like to organize other people's activities.
(A) True (B) False

135. I find it really hard to give up on a project when it proves too difficult.
(A) True (B) False

136. I often prefer not to have people around me.
(A) True (B) False

137. I often lose sleep over my worries. (A) True (B) False

138. When people are friendly they usually want something from me.
(A) True (B) False

139. When people insult me, I try to get even.
(A) True (B) False

140. I usually make up my mind through careful reasoning.
(A) True (B) False

141. Of these two situations I would dislike more:
(A) Being seasick every day for a week while on an ocean voyage,
(B) Having to stand on the window ledge of the 25th Floor of a hotel because there's a fire in my room.

142. People should obey moral laws more strictly than they do.
(A) True (B) False

143. I have never felt that I was better than someone else.
(A) True (B) False

144. I always seem to have something exciting to look forward to.
(A) True (B) False

145. I don't enjoy trying to convince people of something.
(A) True (B) False

146. I like hard work.
(A) True (B) False

147. Never in my whole life have I wished for anything that I was not entitled to.
(A) True (B) False

148. I am rather aloof and maintain distance between myself and others.
(A) True (B) False

149. There are days when I'm "on edge" all of the time.
(A) True (B) False

150. I have had a lot of bad luck.
(A) True (B) False

151. Sometimes I seem to enjoy hurting people by saying mean things.
(A) True (B) False

152. I generally do not like to have detailed plans.
(A) True (B) False

153. It might be fun learning to walk a tightrope.
(A) True (B) False

154. High moral standards are the most important thing parents can teach their children.
(A) True (B) False

155. Sometimes I am so immersed in nature or in art that I feel as if my whole state of consciousness has somehow been temporarily changed.
(A) True (B) False

Appendix C: Drinking and Drug Motives Questionnaire

DRINKING & DRUG* MOTIVES QUESTIONNAIRE

***Modified Version of Cooper, Russell, Skinner, & Windle (1992)**

Participant ID:_____ Date:_____

Instructions:

This questionnaire is used to assess why you like to use alcohol and/or other drugs. Please answer how often you drink and/or use drugs for each of the questions below by circling the appropriate number on a scale of 1 to 4, where *1* equals *almost never/never* and *4* equals *almost always*. Answer as honestly and quickly as possible.

Please try to answer ALL questions, but there is no penalty should you choose not to.

For each question, *how often do you drink and/or use drugs....*

1. **As a way to celebrate?**

Almost Never/Never — Almost Always

1 | 2 | 3 | 4

2. **To relax?**

Almost Never/Never — Almost Always

1 | 2 | 3 | 4

3. **Because you like the feeling?**

Almost Never/Never — Almost Always

1 | 2 | 3 | 4

4. **Because it is what most of your friends do when you get together?**

Almost Never/Never — Almost Always

1 | 2 | 3 | 4

5. To forget your worries?

Almost Never/Never — Almost Always

1 2 3 4

6. Because it's exciting?

Almost Never/Never — Almost Always

1 2 3 4

7. To be sociable?

Almost Never/Never — Almost Always

1 2 3 4

8. Because you feel more self-confident or sure of yourself?

Almost Never/Never — Almost Always

1 2 3 4

9. To get high?

Almost Never/Never — Almost Always

1 2 3 4

10. Because it is customary on special occasions?

Almost Never/Never — Almost Always

1 2 3 4

11. Because it helps you when you feel depressed or nervous?

Almost Never/Never — Almost Always

1 2 3 4

12. Because it's fun?

Almost Never/Never — Almost Always

1 2 3 4

13. Because it makes a social gathering more enjoyable?

Almost Never/Never — Almost Always

1 2 3 4

14. To cheer up when you're in a bad mood?

Almost Never/Never — Almost Always

1 2 3 4

15. Because it makes you feel good?

Almost Never/Never — Almost Always

1 2 3 4

Appendix D: Substance Use Questionnaires

Alcohol Dependence Scale (ADS)

(Skinner & Horn, 1984)

INSTRUCTIONS:

1. Carefully read each question and the possible answers provided. Answer each question by circling the ONE choice that is most true for you.

2. The word "drinking" in a question refers to "drinking of alcoholic beverages."

3. Take as much time as you need. Work carefully, and try to finish as soon as possible. Please try to answer ALL questions, but there is no penalty should you choose not to.

These questions refer to the prior 12 months in the community

1. How much did you drink the last time you drank?

   a. Enough to get high or less

   b. Enough to get drunk

   c. Enough to pass out

2. Do you often have hangovers on Sunday or Monday mornings?

   a. No

   b. Yes

3. Have you had the "shakes" when sobering up (hands tremble, shake inside)?

   a. No

   b. Sometimes

   c. Often

4. Do you get physically sick (e.g., vomit, stomach cramps) as a result of drinking?

   a. No

   b. Sometimes

   c. Almost every time I drink

5. Have you had the "DTs" (delirium tremens) - that is, seen, felt or heard things not really there; felt very anxious, restless, and over excited?

a. No

b. Sometimes

c. Several times

6. When you drink, do you stumble about, stagger, and weave?

a. No

b. Sometimes

c. Often

7. As a result of drinking, have you felt overly hot and sweaty (feverish)

a. No

b. Once

c. Several times

8. As a result of drinking, have you seen things that were not really there?

a. No

b. Once

c. Several times

9. Do you panic because you fear you may not have a drink when you need it?

a. No

b. Yes

10. Have you had blackouts ("loss of memory" without passing out) as a result of drinking?

a. No, never

b. Sometimes

c. Often

d. Almost every time I drink

11. Do you carry a bottle with you or keep one close at hand?

    a. No

    b. Some of the time

    c. Most of the time

12. After a period of abstinence (not drinking), do you end up drinking heavily again?

    a. No

    b. Sometimes

    c. Almost every time I drink

13. In the past 12 months, have you passed out as a result of drinking?

    a. No

    b. Once

    c. More than once

14. Have you had a convulsion (fit) following a period of drinking?

    a. No

    b. Yes

    c. Several times

15. Do you drink throughout the day?

    a. No

    b. Yes

16. After drinking heavily, has your thinking been fuzzy or unclear?

    a. No

    b. Yes, but only for a few hours

    c. Yes, for one or two days

    d. Yes, for many days

17. As a result of drinking, have you felt your heart beating rapidly?

a. No

b. Yes

c. Several times

18. Do you almost constantly think about drinking and alcohol?

a. No

b. Yes

19. As a result of drinking, have you heard "things" that were not really there?

a. No

b. Yes

c. Several times

20. Have you had weird and frightening sensations when drinking?

a. No

b. Once or twice

c. Often

21. As a result of drinking, have you "felt things" crawling on you that were not really there (e.g., bugs, spiders)?

a. No

b. Yes

c. Several times

22. With respect to blackouts (loss; of memory):

a. Have never had a blackout

b. Have had blackouts that last less than an hour

C. Have had blackouts that last for several hours

d. Have had blackouts that last a day or more

23. Have you tried to cut down on your drinking but failed?

    a. No

    b. Once

    c. Several times

24. Do you gulp drinks (drink quickly?)

    a. No

    b. Yes

25. After taking one or two drinks, can you usually stop?

    a. Yes

    b. No

DRUG USE QUESTIONNAIRE (DAST-20)

ID Number _____ Date_____

The following questions concern information about your potential involvement with drugs not including alcoholic beverages during the prior 12 months in the community. Carefully read each statement and decide if your answer is "Yes" or "No". Then, circle the appropriate response beside the question.

In the statements "drug abuse" refers to (1) the use of prescribed or over the counter drugs in excess of the directions and (2) any non-medical use of drugs. The various classes of drugs may include: cannabis (e.g. marijuana, hash), solvents, tranquilizers (e.g. Valium), barbiturates, cocaine, stimulants (e.g. speed), hallucinogens (e.g. LSD) or narcotics (e.g. heroin). Remember that the questions do not include alcoholic beverages.

You are encouraged to respond to all questions, but there is no penalty for choosing not to answer should you decide to skip a question. If you have difficulty with a statement, then choose the response that is mostly right.

These questions refer to the prior 12 months in the community.

Circle your response

1. Have you used drugs other than those required for medical reasons?..... Yes No
2. Have you abused prescription drugs? ..... Yes No
3. Do you abuse more than one drug at a time? ..... Yes No
4. Can you get through the week without using drugs? ..... Yes No
5. Are you always able to stop using drugs when you want to?..... Yes No
6. Have you had "blackouts" or "flashbacks" as a result of drug use? ..... Yes No
7. Do you ever feel bad or guilty about your drug use? ..... Yes No

8. Does your spouse (or parents) ever complain about your involvement with drugs? ..... Yes No

9. Has drug abuse created problems between you and your spouse or your parents? ..... Yes No

10. Have you lost friends because of your use of drugs? .....Yes No

11. Have you neglected your family because of your use of drugs? ..... Yes No

12. Have you been in trouble at work because of drug abuse? ..... Yes No

13. Have you lost a job because of drug abuse? ..... Yes No

14. Have you gotten into fights when under the influence of drugs? ..... Yes No

15. Have you engaged in illegal activities in order to obtain drugs? .....Yes No

16. Have you been arrested for possession of illegal drugs? ..... Yes No

17. Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs? ..... Yes No

18. Have you had medical problems as a result of your drug use (e.g. memory loss, hepatitis, convulsions, bleeding, etc.)?..... Yes No

19. Have you gone to anyone for help for a drug problem? .....Yes No

20. Have you been involved in a treatment program specifically related to drug use? .....Yes No

Appendix E: Participant Consent Form

Participant Consent Form

Study Title: *Personality and Motives in the Pathogenesis of Substance Use Disorders in Offenders*

Principal Investigators: Shauna Bottos
Carleton University
Telephone: (613) 520-2600

Dr. Ralph Serin, Registered Psychologist
Carleton University
Telephone: (613) 520-2600 Ext.1557

RESEARCH STUDY

Introduction

You are invited to join a research project. The project is being done by researchers at Carleton University in Ottawa, Ontario. We are doing this project to help us determine potential risk factors for the development of substance use disorders so that we can ensure that individuals like you receive the best treatment possible.

What is a Consent Form?

A consent form explains the reasons why the researchers are doing the project. It tells you what will happen, and about any inconvenience, discomfort or risk involved. This is necessary so that you may make a fully informed decision as to whether you want to participate in the study or not.

Please read this carefully. Take as much time as you need. If you would like to, you may take it with you to think about it for a while. Mark anything that you don't understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

Purpose of the Study

Since very little is know regarding the factors that make offenders more likely to develop substance-related problems, by conducting this study, we hope to gain a better understanding of what such factors may be. Ultimately, this will ensure that you, and others like yourself, receive the best treatment possible in the future.

Description of the Study

If you agree to take part in this study, you will be asked to complete a package consisting of six questionnaires. Questions regarding behaviour prior to and during your sentence will be asked. This will take approximately one hour of your time, and can be completed within a single session at your facility. Should you wish to take a short break at any time during the session you may.

Potential Risk/Discomfort

The questionnaires used in this study contain questions of a personal nature and so may cause you some discomfort. Although it is unlikely that this will be the case, should you feel anxious or uneasy answering any of the questions you may either skip the question or withdraw from participation at any time with no penalty to you. Your participation in this study is completely voluntary. In the event that you decide not to complete the study, any of the information that you have provided will remain anonymous and confidential, and will NOT be used for research purposes.

Anonymity and Confidentiality

If you decide to participate in this study, all of the information that you provide will remain anonymous and confidential, and will be seen only by the researchers involved in this study. Your name will not appear on any of the questionnaires you complete. Instead, all data will be coded with a participant number. This consent form will also be kept separate from all of your data so that you cannot be identified. There are, however, limits to confidentiality. For example, should you indicate that you are at risk of harming yourself or someone else, then this must be reported. This also applies if you report committing undisclosed crimes against children for which you have not been convicted. However, any current illegal activity such as using drugs is not asked. If disclosed in general terms it will remain confidential and will NOT be reported or used in the research.

What is Required of Me if I Consent to Participate?

Giving your consent to participate means that you have agreed to complete the questionnaires for the purposes described above. In addition, your consent also permits us to examine information collected by the Correctional Service of Canada in the Offender Management System regarding assessments completed at intake, as well as program information.

In addition, please note that your consent will also allow us to conduct follow-up research which will only apply to electronically determining who has returned to prison and who has not.

Questions or Problems

For further information about the study you can ask the Research Assistant or you can call Dr. Ralph Serin who is in charge of this study. His telephone number is: (613) 520-2600, Ext. 1557 (leave a message if you do not reach him in person). You may reach him by e-mail at: ralph_serin@carleton.ca. You may also e-mail Shauna Bottos, the Principal Investigator, at: shaunabottos@sympatico.ca.

Should you have any ethical concerns about this study, please contact Dr. Janet Mantler (Chair of Carleton University Ethics Committee for Psychological Research) by telephone at: (613) 520-2600, Ext. 4173, or by e-mail: janet_mantler@carleton.ca. Should you have any other concerns about this study you may contact Dr. Mary Gick (Chair of the Department of Psychology) at: 520-2600, Ext. 2648, or mary_gick@carleton.ca.

CONSENT FORM AGREEMENT AND SIGNATURES

I have read the above form and understand the conditions of my participation. My participation in this study is voluntary, and if for any reason, at any time, I wish to leave the experiment I may do so without having to give an explanation. Furthermore, I am also aware that the data gathered in this study is confidential and anonymous with respect to my personal identity. My signature indicates that I agree to participate in this study and consent to the above requirements expected of me.

_____	_____	____/____/____
SIGNATURE OF PARTICIPANT	NAME (PRINTED)	day month year
_____	_____	____/____/____
WITNESS TO PARTICIPANT'S SIGNATURE	NAME (PRINTED)	day month year

Appendix F: Debriefing Form

Debriefing Form

Study Title: *Personality and Motives in the Pathogenesis of Substance Use Disorders in Offenders*

What are we trying to learn from this research?

The purpose of this research is to examine potential risk factors for the development of substance use disorders in offenders. We are particularly interested in the role of personality traits, and an individual's reasons for using alcohol and/or other drugs, in the development of problematic patterns of substance use.

Why is this research important?

This research is important to researchers because, currently, very little is known regarding the relationships between personality traits and substance use disorders in offenders. We also don't know whether the reasons individuals report using substances differ according to their personality traits, and whether such differences are implicated in the development of substance use disorders. Ultimately, a greater awareness of the roles such factors play in substance misuse may be used to improve substance abuse treatment programs in correctional settings and, thereby, lead to a better outcome for those with substance-related problems.

What are our hypotheses and predictions?

Although this research is largely exploratory in nature, we anticipate that several of the personality traits studied will be related substance use disorders, and that different traits may be related to different types of substance use disorders (e.g., alcohol versus drug abuse). We also expect to find different personality traits to be related to diverse reasons for using substances, and that these reasons may form the mechanism through which personality influences substance misuse.

What if I have questions later?

For further information about the study, you may contact Dr. Ralph Serin who is in charge of this study. He may be reached at: (613) 520-2600, Ext. 1557 (leave a message if you do not reach him in person), or by e-mail at: ralph_serin@carleton.ca. You may also e-mail Shauna Bottos, the Principal Investigator of this research project, at: shaunabottos@sympatico.ca.

Should you have any ethical concerns about this study, please contact Dr. Janet Mantler (Chair of Carleton University Ethics Committee for Psychological Research) by telephone at: (613) 520-2600, Ext. 4173, or by e-mail: janet_mantler@carleton.ca. Should you have any other concerns about this study, you may contact Dr. Mary Gick (Chair of the Department of Psychology) at: 520-2600, Ext. 2648 or mary_gick@carleton.ca.

Where can I go to learn more?

A couple of interesting articles on personality, individuals' reasons (i.e., motives) for using substances, and substance use disorders, can be found in the following references:

Cooper, M.L., Frone, M.R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69(5),* 990-1005.

McGue, M., Slutske, W., & Iacono, W.G. (1999). Personality and substance use disorders: II. Alcoholism versus drug use disorders. *Journal of Consulting and Clinical Psychology, 67(3),* 394-404.

Is there anything I can do if I found this experiment to be emotionally upsetting?

If participating in this research has caused you discomfort in any way, please contact the chaplain, prison psychologist, or program officer at your facility.

THANK YOU FOR YOUR PARTICIPATION!

Appendix G: Procedure to Establish Mediation

Sobel's Significance Test

When the conditions of mediation (1-3) were satisfied, the significance of the indirect effect of the independent variable on the dependent variable via the mediator was tested using Sobel's (1982, 1988) significance test. This test is both a test of the indirect effect of the independent variable on the dependent variable (i.e., the product of the independent → mediator and mediator → dependent variable pathways) *and* a test of the drop in the total effect of the independent variable on the dependent variable (i.e., the zero-order predictor → outcome path) (Holmbeck, 2002). Indeed, as demonstrated by MacKinnon and Dwyer (1993) and summarized by Holmbeck (2002), the indirect effect can be shown to be mathematically equivalent to whether a drop in this total effect is significant by the following simple equations (MacKinnon & Dwyer, 1993):

If: Total Effect = Indirect Effect + Direct Effect

Then, by rearranging: Indirect Effect = Total Effect – Direct Effect

Where: Direct Effect = predictor → outcome path coefficient with mediator in the model.

Indirect Effect = (predictor → mediator path coefficient) x (mediator → outcome path coefficient, with predictor in the model).

To Conduct the Statistical Test for Mediation

The following provides a summary of the post-hoc probing procedures described in Holmbeck (2002) that were used in the present study:

1. Unstandardized path coefficients (i.e., unstandardized *b*'s) and their standard errors (SE) were obtained (from the SPSS printout) for: (1) the independent (IV) → mediator

(M) path; and (2) the mediator → dependent variable (DV), with the IV in the model path.

2. Sobel's equation was then used to obtain the standard error of the indirect effect:

$$SE_{\text{indirect effect}} = [(b_{IV \rightarrow M})^2 (SE_{M \rightarrow DV.IV})^2 + (b_{M \rightarrow DV.IV})^2 (SE_{IV \rightarrow M})^2]^{1/2}$$

3. The unstandardized coefficient for the indirect effect was obtained by:

$$b_{\text{indirect effect}} = (b_{IV \rightarrow M}) \times (b_{M \rightarrow DV.\,IV})$$

Where: $b_{M \rightarrow DV.\,IV}$ represents the mediator to DV path (with the IV in the model)

4. Finally, Sobel's z-test was employed:

$$z = b_{\text{indirect effect}} / SE_{\text{indirect effect}}$$

A z-table was used to determine the significance of the obtained test statistic. If significant, this indicated that introducing the mediator variable into the model resulted in a significant reduction in the strength of the IV → DV relationship.

5. Although not necessary, subsequent to the Sobel test for significance, the total effect (i.e., zero-order IV → DV unstandardized *b*) was obtained from the SPSS printout in order to ascertain the percentage of the total effect that was mediated (MacKinnon & Dwyer, 1993):

$$[b_{\text{indirect effect}} / b_{\text{total effect}}] \times 100 = \%$$

Appendix H: Description of Data and Transformations

Overview of Data and Transformations

Variable	Distribution/ Violation	Original Distribution/ *M (SD)* [Range]	Correction	Revised Distribution/ *M (SD)* [Range]
Demographic Variables				
Age	Normal dist.	40.3 (10.3) [20-61]	N/A	N/A
Education	Normal dist.	7.9 (2.9) [1-13]	N/A	N/A
Marital Status	No violation	'Married/common-law' = 30% 'Single/widowed/ divorced' = 70%	N/A	N/A
Ethnicity	Base-rate <10%	'Caucasian' = 85% 'Aboriginal' = 6% 'Black' = 6% 'Asian' = 1% 'Other' = 2%	Dropped from inferential analyses	N/A
Program Participation				
Time in substance abuse treatment	Skew (+) Kurtosis (+) 3 outliers	68.3 (87.7) [0-497]	Recoded 3 outliers to next highest value (recoded 497, 426, and 309 to 270)	64.0 (71.6) [0-270]
Offense-Related Variables				
Multiple offenses	No violation	'yes' = 62%	N/A	N/A
Determinate sentence	No violation	'yes' = 75%	N/A	N/A
Sentence length (days)	Normal dist.	3535.9 (3404.9) [730-9125]	N/A	N/A
Security level	No violation	'minimum' = 67%	N/A	N/A
Homicide	No violation	'yes' = 29%	N/A	N/A
Sex offense	Base-rate <10%	'yes' = 8%	Dropped from inferential analyses	N/A
Drug offense	No violation	'yes' = 17%	N/A	N/A
Break & Enter	No violation	'yes' = 14%	N/A	N/A

(table continues)

Table continued...

Variable	Distribution/ Violation	Original Distribution/ *M (SD)* [Range]	Correction	Revised Distribution/ *M (SD)* [Range]
Robbery	No violation	'yes' = 27%	N/A	N/A
Theft	No violation	'yes' = 22%	N/A	N/A
Arson	Base-rate <10%	'yes' = 1%	Dropped from inferential analyses	N/A
Fraud	Base-rate <10%	'yes' = 7%	Dropped from inferential analyses	N/A
DUI	Base-rate <10%	'yes' = 8%	Dropped from inferential analyses	N/A
Assault/Aggravated	No violations	'yes' = 14%	N/A	N/A
Higher-Order MPQ-BF Traits				
PEM	Normal dist.	28.0 (9.1) [7-43]	N/A	N/A
NEM	Normal dist.	12.6 (8.1) [0-29]	N/A	N/A
CON	Normal dist.	22.6 (5.4) [10-33]	N/A	N/A
Absorption	Normal dist.	5.7 (2.9) [0-12]	N/A	N/A
Motives for Substance Use				
Social	Normal dist.	12.9 (4.4) [4-20]	N/A	N/A
Coping	Normal dist.	13.5 (5.0) [5-20]	N/A	N/A
Enhancement[1]	Heterogeneity of error term variances	14.1 (4.7) [4-20]	Box-Cox transformation: $\lambda = 3.556$	17805.5 (13986.1) [138-42312]

(table continues)

Table continued...

Variable	Distribution/ Violation	Original Distribution/ *M (SD)* [Range]	Correction	Revised Distribution/ *M (SD)* [Range]
Substance Use Variables				
Total ADS score[2]	Skew (+) Nonnormality of error term distribution	9.1 (9.7) [0-38]	Box-Cox transformation for: 1. PEM-related analyses: $\lambda = 0.659$	3.6 (3.1) [0-11]
			2. NEM-related analyses: $\lambda = 0.661$	3.6 (3.2) [0-11]
			3. CON-related analyses: $\lambda = .456$	2.1 (1.6) [0-5]
Total DAST score	Normal dist.	9.5 (6.5) [0-20]	N/A	N/A
AD Severity	Base-rate <10%	'None' = 28% 'Low' = 45% 'Moderate' = 15% 'Substantial' = 9% 'Severe' = 3%	N/A	N/A
DD Severity	No violation	All categories >10%	N/A	N/A
SUD diagnosis	Base-rate <10%	'None' = 46% 'AUD only' = 4% 'DUD only' = 42% 'Poly. Depend.' = 8%	Dropped from inferential analyses	N/A
Any type of SUD	No violation	'yes' = 54%	N/A	N/A

Note. DUI = Driving under the influence; MPQ-BF = Multidimensional Personality Questionnaire – Brief Form; PEM = Positive emotionality; NEM = Negative emotionality; CON = Constraint; ADS = Alcohol Dependence Scale; DAST = Drug Abuse Screening Test; AD = Alcohol dependence; DD = Drug dependence; SUD = Substance use disorder.

[1]To ensure that nominal alpha levels were protected from potential violations of the statistical assumption underlying the variance homogeneity of the distribution of residuals, the enhancement motives variable was

transformed according to the power transformation suggested by SPSS. Transformations were ascertained on the basis of the diagnostic results associated with the simple linear regression of enhancement motives with each of the higher-order MPQ personality factors separately. Only one transformation was deemed necessary for the enhancement motives variable, namely in any situation in which it was paired with NEM. This included those analyses in which NEM was the predictor variable and enhancement motives was the criterion variable, and when enhancement motives was examined as a mediator of NEM and AD severity and as a mediator of NEM and DD severity.

[2] To ensure that nominal alpha levels were protected from any potential violation underlying the statistical assumption of normality of the distribution of residuals, the AD severity variable was transformed according to power transformations suggested by SPSS. These transformations were made on the basis of the diagnostic results associated with the simple linear regression of the AD severity variable on each of the higher-order MPQ personality factors separately. Three different transformations were deemed necessary depending upon whether AD severity was paired with PEM, NEM, or CON. These transformed scores were employed accordingly.

Appendix I: Sample Characteristics According to Specific SUD Diagnoses

Demographic and Program Participation Characteristics According to Specific SUD Diagnoses[1]

	AUD[a]	DUD[b]	PD[c]	No SUD[d]
Variable	**M(SD) / %**	**M(SD) / %**	**M(SD) / %**	**M(SD) / %**
Age	45.25 (12.63)	38.05 (8.60)	43.50 (13.15)	41.42 (10.78)
Education Level at Intake	9.53 (1.83)	8.16 (2.85)	9.24 (3.29)	7.24 (2.94)
Marital Status				
Married/Common-Law	0%	27%	25%	36%
Single, Widowed, or Divorced	100%	73%	75%	64%
Ethnicity				
Caucasian	100%	82.9%	100%	82%
Aboriginal	0%	5%	0%	9%
Black	0%	8%	0%	7%
Asian	0%	2%	0%	0%
Other	0%	2%	0%	2%
Length of Current Sentence (years)	15.86 (10.77)	7.31 (8.31)	12.68 (10.48)	10.76 (9.59)
Time in Substance Abuse Treatment (days)	124.00 (111.93)	82.27 (105.09)	75.88 (67.97)	49.24 (66.94)

Note.
[1]Direct comparisons amongst the groups cannot reliably be made due to the large differences in sample sizes across groups.
[a]AUD = Alcohol use disorder with no concurrent drug use disorder; $n = 4$.
[b]DUD = Drug use disorder with no concurrent alcohol use disorder; $n = 41$.
[c]PD = Polysubstance dependence (i.e., met criteria for both AUD and DUD); $n = 8$.
[d]No SUD = No substance use disorder (i.e., did not meet criteria for AUD or DUD); $n = 45$.

Offense-Related Characteristics According to SUD Diagnosis[1]

	AUD[a] (*n*/ 4)	DUD[b] (*n*/41)	PD[c] (*n*/8)	No SUD[d] (*n*/45)
Security-Level of Correctional Facility				
Minimum	3	29	7	27
Medium	1	12	1	18
Determinate sentence	2	34	5	32
Offense Type[2]				
Homicide/Attempted Homicide	2	8	3	15
Sexual Offense	1	3	1	3
Drug-Related	0	9	0	8
Break and Enter	0	9	0	5
Robbery	0	12	3	11
Theft	0	14	0	8
Arson	0	0	1	0
Fraud	0	4	0	3
Driving Under the Influence	1	0	1	6
Assault/Aggravated Assault	0	2	0	12
Incarcerated for >1 offense type	1	26	4	30

Note.
N =98.
[1]Comparisons amongst diagnostic categories cannot reliably be made due to the large differences in sample sizes across groups. All numerical values in the table correspond to *n*'s.
[2]Type of offense the individual was serving their current sentence for. Participants may be classified under more than one offense category.
[a]AUD = Alcohol use disorder with no concurrent drug use disorder; *n* = 4.
[b]DUD = Drug use disorder with no concurrent alcohol use disorder; *n* = 41.
[c]PD = Polysubstance dependence (i.e., met criteria for both AUD and DUD); *n* = 8.
[d]No SUD = No substance use disorder (i.e., did not meet criteria for AUD or DUD); *n* = 45.