The Pre- and Post-Incarceration Substance Use Patterns of Three High Risk Personality Types

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By

Peter C. Forkner
Masters of Arts
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Director: June P. Tangney, Professor
Department of Psychology

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Fairfax, VA
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DEDICATION

This is dedicated to my daughter, Mabel Stuart Forkner.
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I would like to thank all who helped make this possible. First of all, I want to thank my advisor June Price Tangney, Ph.D. Thank you for helping me take an idea and developing it into something of which I can be proud. I’d also like to thank her partner in crime, Jeffrey B. Stuewig, Ph.D.. Without you, I never would have made it out of SPSS alive. I am also grateful for the help from my other two committee members, Linda Chrosniak, Ph.D. and Michael Wolf-Branigin, Ph.D.. I’d also like to thank my wife, Rebecca Duckworth Forkner (soon to be Ph.D.) for her encouragement and motivation - you are an inspiration. Additionally, thanks to all the members of the Human Emotions Research Lab for help with data collection and entry. Last, but certainly not least, thanks to all of the participants who agreed to participate in the GMU Inmate Study.
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ABSTRACT

THE PRE- AND POST-INCARCERATION SUBSTANCE USE PATTERNS OF THREE HIGH RISK PERSONALITY TYPES

Peter C. Forkner, Ph.D.

George Mason University, 2009

Dissertation Director: June P. Tangney, Ph.D.

It has long been known that certain personality traits are associated with higher risk for substance use and abuse. The present study sought to examine the pre- and post incarceration substance use patterns of three high risk personality types: anxiety/depression (“Emotional Pain”), impulsivity (“Impulsive Lifestyle”), borderline personality features (“Borderline”). All groups were chosen based on motivational models of substance use. All high risk groups were compared to a low risk control group as well as to each other. Results suggest that inmates high in anxiety/depression did not differ from controls and in comparison, inmates high in impulsivity or borderline personality features were significantly more likely to use substances at an earlier age, use more different types of substances, use substances more frequently, and report more symptoms of substance dependence. Unlike inmates high in impulsivity, inmates high in borderline personality features continued to exhibit significantly greater symptoms of dependence even after controlling for frequency of use. These findings suggest that
different personality risk factors use do indeed correspond with different patterns of
substance use and that personality screening at intake may be beneficial for indentifying
those inmates who are most in need for withdrawal and relapse prevention services.
INTRODUCTION

There are numerous reasons why individual substance users choose to abuse substances despite being aware of the negative health, economic, and social consequences. Some research suggests that these reasons can vary depending on the psychological characteristics that guide the individual (Cloninger, 1987; Conrod, Pihl, Stewart, & Dongier, 2000; Cox & Klinger, 1988). For example, some studies have shown that people with mental health problems such as anxiety and depression are more likely to use substances as a way of coping with their emotions, whereas, other people who are high in impulsivity and sensation seeking tend use substances as a way of enhancing their experiences (Cooper, Frone, Russel, & Mudar, 1995). Research has also shown that people with different reasons for substance use display different patterns of drug and alcohol use (Kuntsche, Knibbe, Gmel, & Engels, 2005).

Given these findings, it is clearly important to consider a person’s psychological characteristics and motivations for substance use when designing treatment plans. To elaborate, people who are high in depression and anxiety may benefit from a substance abuse treatment plan that seeks to replace their maladaptive substance abuse with a more adaptive strategy for dealing with their emotional problems. In the same respect, people who are high in impulsivity and sensation seeking may benefit from a treatment plan
designed to explore their need for enhancement and educate them as to the
destructiveness of their continued use.

This study drew upon data from a larger prospective study of criminal offenders. Four groups were selected based on psychological characteristics relevant to substance use and abuse. Group 1 or the “Emotional Pain” group was composed of inmates who reported experiencing significant anxiety and/or depression and thus who may have been using substances as a way of coping with their emotions. Group 2 or the “Impulsive Lifestyle” group was composed of inmates who were high in the impulsive lifestyle facet of psychopathy and thus who may have been using substances primarily for enhancement of positive affect. Group 3 or the “Borderline” group was composed of inmates high in borderline personality characteristics. Given that the two major features of borderline personality disorder are affective instability and impulsivity (Siever & Davis, 1991), these inmates may have been using substances both for coping and enhancement reasons. Group 4 or the “Low Symptom Control” group was composed of inmates who are low in the characteristics that define the other three groups.

Through analysis of the drug and alcohol use patterns of each group, this study examined the degree to which high levels of theoretically relevant psychological characteristics puts one at greater risk for problematic substance use. The study also examined the extent to which various combinations of these characteristics are associated with a unique pattern of use. Specifically, this study attempted to determine whether being high in both emotional pain and impulsivity is associated with problematic
substance use above and beyond what could be expected from either characteristic alone and their additive effects.

**Psychological Characteristics and Models of Addiction**

That psychological characteristics are related to an individual’s propensity to engage in substance use is not a new concept. Over the years, there have been many theories suggesting that one’s personality can influence addiction susceptibility (Cloninger, 1987; Dawe & Loxton, 2004). Prior research has shown that problematic substance use is frequently associated with a number of psychological and personality characteristics (Walton & Roberts, 2004). Two of the most frequently cited characteristics are anxiety/depression and impulsivity/sensation seeking (Dawe & Loxton, 2004; Miller, Klamen, Hoffmann, & Flaherty, 1996; Thorberg & Lyvers, 2006). The following section will review the theoretical models associated with these characteristics individually and summarize what has been found with regards to their association with substance use. The section will then discuss research that has examined models that integrate both high risk characteristics as well as review the literature demonstrating the connection between borderline personality disorder, a condition which is primarily rooted in high emotionality and impulsivity (Siever & Davis, 1991), and substance abuse.

*Anxiety and Depression: Coping Models and Research*

*Theoretical models.*
Some of the first theoretical models that sought to explain substance use generally depicted problematic use as originating from a desire to cope with negative affect or stress. One of the original theories, the tension reduction hypothesis, is a behavioral model that focused specifically on alcoholism and was based upon reinforcement and drive reduction theory (Conger, 1956). Specifically, the tension reduction hypothesis suggests that people drink alcohol when experiencing stress; ingestion of alcohol leads to a decrease in the subjective level of stress. As a person continues to reduce his or her level of stress with alcohol, this behavior becomes reinforced as the dominant stress coping mechanism.

Another popularized theory that sought to explain substance abuse as a way of coping with negative affect is the self-medication hypothesis (Khantzian, 1985). The self-medication hypothesis is based in psychoanalytic concepts and suggests that people are predisposed to become dependent on a drug that best helps them cope with their particular emotional problem. Khantzian proposed that the psychopharmacological effects of different types of drugs are differentially suited for relieving specific types of psychological stress. Specifically, Khantzian believes that opiates are more likely to be abused by people experiencing intense rage, depressants are more likely to be abused by people with rigid defenses who experience feelings of isolation, emptiness, and anxiety, and stimulants are more likely to be abused by people who are either bored and depressed or hyper and manic (Khantzian, 1997).

Correlational research.
Although one cannot infer causality from correlational research, it is nevertheless important to examine what has been found in this area to determine whether factors such as anxiety and depression are indeed associated with substance use or abuse. Overall, there has been a substantial amount of correlational research suggesting an association between anxiety and/or depression and problematic substance use. For example, Mehrabian (2001) completed three studies of non-clinical populations in which a total of 369 participants were given measures assessing trait anxiety, depression, panic, severity of alcohol use, severity of drug use, and past treatment for depression. When looking at all three studies combined, all intercorrelations among the variables examined were significantly positive. Of note, severity of drug use was found to be moderately correlated with depression and panic. Furthermore, in all three studies, severity of drug use was also moderately to markedly correlated with a previous history of treatment for depression (Mehrabian, 2001). These findings have been supported in other studies as well. For example, it has been shown that people who abuse drugs and alcohol are more likely to report higher levels of anxiety and depression than people with no self-reported history of substance use (Miller et al., 1996; Thorberg & Lyvers, 2006). From these correlational studies, we can generally conclude that both anxiety and depression are associated with substance use and substance use problems.

Correlational research also suggests that people diagnosed as having an anxiety- or depression-related disorder are more likely to be diagnosed with a comorbid substance use disorder as well. Specifically, according to data from the National Comorbidity Survey, a representative household survey designed to examine patterns and correlates of
psychiatric morbidity and comorbidity, those diagnosed with generalized anxiety disorder are twice as likely to be diagnosed with a comorbid substance use disorder in their lifetime. Furthermore, for those people diagnosed as having panic disorder, there is a three times greater likelihood of a lifetime occurrence of a substance use disorder (Kessler, Crum, Warner, Nelson, & et al., 1997). The finding that those diagnosed with mood and anxiety disorders exhibit greater rates of co-morbid substance use disorders has also been supported by studies using participants recruited from outpatient and residential psychiatry facilities (Sbrana et al., 2005) and from the general US population as a part of the National Epidemiologic Survey on Alcohol and Related Conditions (Grant et al., 2004). The link between substance use disorders and anxiety and depression was also confirmed in an international study of 29,705 participants from five different countries (USA, Germany, Mexico, Netherlands, and Canada) (Merikangas et al., 1998). Using the World Health Organization’s Composite International Diagnostic Interview, the authors found that, across all countries, people diagnosed with mood and anxiety disorders were more likely to also exhibit alcohol problems and dependence based on DSM-III-R criteria. Furthermore, the number of mood and anxiety disorders diagnosed was positively correlated with the magnitude of comorbid substance use disorders. The number of mood and anxiety disorders was also positively correlated with the severity of drug use, however not for severity of alcohol use. The authors explain this discrepancy between drug and alcohol use severity as a result of the increased deviancy associated with drug use and the consequent lower threshold for diagnosis, as well as the social acceptance of alcohol use (Merikangas et al., 1998). Interestingly, Merikangas et al. also
found that the onset of anxiety disorders typically preceded the development of substance use disorders. The authors interpret this as support for the self-medication hypothesis of substance use whereby people with anxiety are apt to seek out substances that help them cope with their anxiety (Merikangas et al., 1998). All together, these studies on diagnostic comorbidity offer further evidence that people with anxiety and depression are more likely to also encounter problems with substance use.

There has also been a significant amount of research demonstrating a relationship between substance use and anxiety sensitivity (i.e. the fear of anxiety and anxiety related sensations). Specifically, anxiety sensitivity has been positively associated with self reported weekly alcohol use (Stewart, Peterson, & Pihl, 1995), symptoms of alcohol dependence, and severity of drinking problems (Koven, Heller, & Miller, 2005). Anxiety sensitivity has been shown to be higher in substance using as compared to non-substance using populations as well (Lejuez, Paulson, Daughters, Bornovalova, & Zvolensky, 2006). In their study, Lejuez et al. compared the anxiety sensitivity scores of four groups: heroin users, crack/cocaine users, both heroin and crack/cocaine users and those who did not use either heroin or crack/cocaine. Heroin users reported significantly greater anxiety sensitivity than any of the other groups. The groups that used both cocaine/crack and heroin and crack/cocaine alone also reported higher anxiety sensitivity than the group that did not report using either drug, but this difference was not statistically significant. All results remained even after controlling for use of other drugs, depressive symptoms, and demographic variables (Lejuez et al., 2006).
It should be noted that some studies have failed to replicate these findings (Novak, Burgess, Clark, Zvolensky, & Brown, 2003). In their study, Novak et al. administered anxiety sensitivity and drinking motives measures to a group of non-clinical university students. Despite finding no correlation between level of anxiety sensitivity and level of alcohol consumption, the authors did find that level of anxiety sensitivity was correlated with using alcohol as a means to cope with negative affect. Because a tendency to use alcohol to cope has been associated with higher rates of abusive drinking patterns, the authors suggest that those with high anxiety sensitivity are at risk for alcohol abuse. Wagner (2001) also reported conflicting evidence regarding the link between anxiety sensitivity and substance use. In his study, Wagner reports that he found that anxiety sensitivity was negatively correlated with substance abuse, a finding he attributes to using a non-clinical population. It should be noted, however, that the author does not clearly state how he chose to define and measure substance use and thus it is difficult to interpret these results.

In all, research examining the link between anxiety/depression and substance use suggests that they are significantly correlated. People exhibiting high levels of either anxiety or depression are more apt to engage in higher levels of both drug and/or alcohol use. There is also evidence that people demonstrating problematic use of alcohol and/or drugs are more likely to have comorbid mood and/or anxiety problems. Additionally, there is evidence that higher anxiety sensitivity (i.e. the fear of experiencing anxiety symptoms) puts one at greater risk for substance abuse.
Research examining causality.

Some research has sought to examine specifically whether anxiety or depression actually causes people to have more problematic substance use patterns. Critics of the tension reduction and self-medication hypotheses have suggested that the reason anxiety and depression are so often correlated with substance use is that people who severely abuse substances experience affective problems as symptoms of drug and alcohol withdrawal. To test this criticism, Swendsen et al. (2000) used an experience sampling method and examined within-subject mood states and daily alcohol consumption of 100 moderate drinkers. As a part of the study, participants were asked to take a brief mood interview via handheld computer at multiple times over the course of a day over a 30 day period. Participants were also asked about the number of drinks consumed each day. Results of the study indicated that a higher within-subject level of nervousness between 8:00 and 9:30 p.m. was significantly associated with increased alcohol consumption later that night even after controlling for sex, age, and amount of alcohol consumed prior to the mood assessment. Furthermore, cross-sectional analysis showed that alcohol consumption was associated with a reduction of overall nervousness suggesting that drinking alcohol was a successful at relieving anxious feelings. These results give support to the self-medication theory of substance use by suggesting that people use alcohol to relieve negative anxious affect and that drinking alcohol is an effective way to do so. It should be noted, however, that trait depression and trait anxiety were not found to be associated with later alcohol consumption, findings that conflict with correlational evidence discussed earlier. However, it was shown that the benefit of drinking alcohol
(i.e. a reduction in nervousness) was higher for people with higher trait anxiety scores (Swendsen et al., 2000). Together, these results suggest that people experiencing higher levels of nervousness within a given day are more likely to consume more alcohol that evening and that alcohol is an effective way of relieving their nervousness. Furthermore, while those who have higher levels of trait anxiety are not necessarily more likely to drink when nervous, they tend to experience greater relief from nervousness should they decide to consume alcohol. As such, nervousness combined with trait anxiety might be conceived as a risk factor for problematic alcohol use.

In a similar experience sampling study examining positive and negative affect and alcohol use, people reporting higher levels of negative affect during the day consumed more alcohol at night and were more likely to experience alcohol related problems even after controlling for amount of consumption (Simons, Gaher, Oliver, Bush, & Palmer, 2005). This would suggest that drinking in order to cope with negative affect is more likely to lead to alcohol related problems (e.g. neglecting responsibilities, getting into an argument or fight, harming a friend or love relationship, etc.) above and beyond what would be expected given the amount of alcohol consumed.

With respect to drug use, very few studies have examined whether people higher in negative affect states are more likely use drugs as a result. Contrary to findings from the previously described Experience Sampling Method studies examining negative affect and alcohol use, the one study examining drug use (in a non-clinical population) found no association between level of state anxiety and subsequent marijuana use (Tournier et al., 2003). Furthermore, use of marijuana was not associated with subsequent decreases in
level of state anxiety. These results suggest that people experiencing state anxiety are not more likely to use marijuana and, if used, marijuana does not produce an anxiolytic effect. However, the authors did find that a diagnosis of an anxiety disorder was associated with an increased likelihood of using marijuana during the course of the study (one week). Specifically, participants diagnosed with an anxiety disorder were twice more likely to have used marijuana than those with no diagnoses. Although not discussed by the authors, it is possible that the discrepancy in these findings may be a result of the differences in subjective ratings of state anxiety between people with anxiety disorders and people without anxiety disorders (i.e. an average level of state anxiety may be higher for someone diagnosed with an anxiety disorder than someone without a diagnosis). Unfortunately, at this time there have been no studies examining causality with respect to negative affect and heroin or cocaine use.

Together, the research has shown that there is a clear link between anxiety and depression and substance use. Specifically, it generally can be concluded that people with trait anxiety or depression and people with diagnosed anxiety or depressive disorders use alcohol and drugs more frequently and experience more substance use related problems than people without anxiety or depression. There is mixed evidence that people with high anxiety sensitivity experience greater substance abuse problems. Research examining causality suggests that people who experience negative affect or nervousness during the day are more likely to use more alcohol and experience more alcohol related problems that night. At this time, this does not appear to be the case for drug use; however, further research needs to be conducted to confirm this finding.
Impulsivity/Sensation Seeking: Enhancement Models and Research

Theoretical models.

Impulsivity, or the tendency to act rashly without consideration for the consequences of one’s actions, is another psychological characteristic that has been shown to be associated with increased risk for substance abuse. Some researchers theorize that people high in this characteristic are more likely to have problems with drugs and/or alcohol use because, compared to people low in impulsivity, they are more driven to engage in reward seeking behavior and are less able to properly assess the negative consequences of their actions (Colder & Chassin, 1997).

Dawe, Gullo, and Loxton (2004) proposed a model suggesting that impulsivity is another psychological characteristic that can influence the likelihood of problematic substance use. According to their theory, people who are high in two facets of impulsivity, namely reward sensitivity and rash spontaneous impulsivity, are more likely to engage in problematic substance use than those who are low in these traits. The authors suggest that people high in reward sensitivity have biological deficits (e.g. lower levels of dopamine) that make enjoyable or novel stimuli inherently more rewarding. Consequently, people high in reward sensitivity are more likely to seek out rewarding stimuli as well as more vulnerable to their reinforcing effects. On the other hand, people who are high in rash spontaneous impulsivity also have biological deficits (e.g. prefrontal cortex impairment) that contribute to an inability to inhibit themselves and consider the consequences of their actions. As such, being high in rash spontaneous impulsivity increases the likelihood that one would engage in short term rewarding activities, such as
substance abuse, despite long term negative consequences. Accordingly, people who are elevated in both of these traits are more likely to seek out rewarding stimuli (such as drugs and alcohol) and more likely to engage in these activities without consideration for the negative consequences (such as problems at work and home).

Although not formally presented in a model, it has also been suggested that impulsivity may contribute to maladaptive substance use in that people who are highly impulsive are less likely to adhere to social norms and are less likely to be fearful of the potential harm of substance use (Colder & Chassin, 1997). In sum, impulsivity is thought to put people at risk for substance abuse because impulsive people may be highly sensitive to reward, are less likely to consider the consequences of their actions, and have less consideration for conventional behavior.

**Correlational Research.**

There has been a significant amount of research documenting impulsivity and its association with substance use. People who are impulsive generally demonstrate more problems with drugs and alcohol. For example, studies have shown high levels of impulsivity to be associated with high rates of alcohol consumption (Waldeck & Miller, 1997) and marijuana and alcohol use problems (Simons et al., 2005). In addition to also finding a positive correlation between impulsivity and substance use related problems, Henderson, Galen, & DeLuca (1998) found that in a sample of 147 war veterans, impulsivity was negatively correlated with the age of substance use onset. Impulsivity has also been found to be positively correlated with the severity of drug use and drug
withdrawal symptoms (Moeller et al., 2001). For example, in a study of 50 treatment seeking cocaine users, Moeller et al. found that level of impulsivity was correlated with self reported quantity of cocaine used per day and the severity of cocaine withdrawal symptoms. Together, these studies suggest that those who are more impulsive are more likely to use more drugs and alcohol, have more drug and alcohol related problems, and begin using substances earlier than people who are lower in impulsivity.

Research has also shown that people with substance use problems exhibit more problems with impulsivity than do people without. For example, in a study of 58 non-clinical participants conducted by Allen, Moeller, Rhoades, & Cherek (1998), those participants who reported a history of drug dependence scored significantly higher on a self-report measure of impulsivity. Furthermore, in a delayed behavior reward computer task which asked participants to choose between smaller more immediate reinforcers and larger more delayed reinforcers, those with histories of substance dependence demonstrated significantly shorter mean delay intervals for larger rewards indicating a generally less tolerance for waiting for the reward (Allen et al., 1998).

Impulsivity has also been found to moderate the relationship between substance use and substance use problems. For example, Wills, Sandy, and Yaeger (2002) completed two independent self report studies on 1,699 and 1,225 adolescents examining the moderating effects of self-control, a construct similar to impulsivity, on level of substance use (a four item composite variable that measured frequency of cigarette, alcohol, and marijuana use as well as heavy drinking in the past month) and substance use problems (a variable that measured frequency of physical or psychosocial problems
in significant life domains as a result of substance use). The authors found that poor self-control as evidenced by maladaptive coping styles, impulsiveness, and generalized poor self-control increased the relationship between level of substance use and substance use problems. These findings suggest that those who demonstrate problems with self-control are more likely to have problematic substance use.

Sensation seeking, generally defined as “the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience,” is another construct related to impulsivity that is correlated with problematic substance use (Zuckerman, 1979). In a meta-analysis of 61 studies examining the relationship between alcohol use and sensation seeking, Hittner and Swickert (2006) found a significant positive correlation of small to moderate effect size. Furthermore, the authors found that disinhibition, a component of sensation seeking that is most similar to the construct of impulsivity, was the facet most highly correlated with substance use.

Research examining causality.

There has been some research examining whether higher impulsivity actually leads to greater substance abuse problems or whether people with substance abuse problems are just generally more impulsive. For example, to clarify the casual relationship between impulsivity and substance abuse, Mauraven, Collins, Shiffman, and Paty (2005) examined self-control, a characteristic related to impulsivity. The authors defined self-control as the ability to inhibit, override, or change a behavior, urge,
emotion, or thought to reach a goal. They hypothesized that people are more likely to drink to excess on days in which they experienced greater self-control demands, thus having depleted their ability to inhibit themselves. To examine this, the authors gave 106 young adults electronic diaries for three weeks to monitor their daily mood, drinking behaviors, and self-control demands. Results of the study showed that participants drank more alcohol, were more intoxicated, and were more likely to violate personally established limits on amount of alcohol intake on days they had experienced more self-control demands. These findings remained even after controlling for mood prior to drinking episode and self-reported urge to drink. These results suggest that when a person is more impulsive due to contextual factors, he or she is more likely to engage in maladaptive alcohol use.

**Integrated Models of Substance use**

*Theoretical models.*

Another way in which researchers have conceptualized coping and impulsive models of substance use is that people who use substances to cope are seeking to decrease negative affect, whereas people who use impulsively are seeking to increase positive affect. One of the more popular models that has integrated both of these ideas is the motivational model of alcohol use developed by Cox and Klinger (1988). Cox and Klinger suggest that people who use alcohol choose to drink based upon the belief that the affective consequences of drinking outweigh those of not drinking. In other words, an individual will make the choice to drink if he or she believes that by doing so, positive
affect will be increased or negative affect will be decreased. According to the model, there are a number of factors that contribute to one’s belief about the affective consequences of alcohol use including historical (the way the body processes alcohol, personality characteristics, sociocultural/environmental influences, and past reinforcement/conditioned reactions to drinking), current life situation (immediate context, positive and negative reasons for drinking), and drinking expectations (how drinking will make him or her feel and what drinking might prevent or enhance their ability to accomplish). These factors are then weighed together, either consciously or subconsciously, before the decision to drink or not drink is made.

Drawing from the model presented by Cox and Klinger (1988), Cooper, Frone, Russel, and Mudar (1995) proposed a model of alcohol use and abuse that focuses on use of alcohol to regulate emotions. Specifically, Cooper et al. suggest that people drink alcohol in order to either help cope with negative emotion or increase positive affective states. In testing their model, they showed that factors such as sensation seeking, positive emotion, and social/emotional enhancement expectancies about alcohol predicted enhancement motivations and that factors such as avoidance coping style, negative emotion, and tension reduction expectancies about alcohol predicted coping motivations. Research has shown consistently that people using substances to reduce negative affect (Carey & Carey, 1995; Cooper, 1994; Cooper et al., 1995; Simons, Correia, Carey, & Borsari, 1998; Smith, Abbey, & Scott, 1993) and increase positive affect (Cooper, 1994; Cutter & O'Farrell, 1984; McCarty & Kaye, 1984; Smith et al., 1993) are more likely to have problematic substance use patterns than people using for other motivations.
Although not formally presented as a model of substance abuse, some researchers have discussed the impact of both negative affectivity and impulsivity on substance use behaviors. For example, in their study of adolescent alcohol involvement, Colder and Chassin (1997) suggest that adolescents with both negative affectivity and impulsivity are more likely to engage in maladaptive behaviors, such as substance use, as a way to cope with their emotions. Furthermore, adolescents high in both psychological characteristics generally have relatively poorer social skills and thus are more likely to associate with deviant substance-using peers. In support of this theory, the authors cite laboratory studies which suggest that people high in impulsivity experience greater stress relief from alcohol use. For example, in a study conducted by Sher and Levenson (1982), participants recruited through newspaper advertisements were randomly assigned to one of two groups. The first group was asked to compose a self-disclosing speech in six minutes and then deliver the speech in front of a camera. The second group was told that they were to be administered an electric shock in six minutes. The results showed that those who were at high risk for alcoholism and consumed a specified amount of alcohol before group assignment benefited significantly more from the stress reducing effects of alcohol than those who were assessed to be at low risk. Stress reduction was measured both by self report level of anxiety and cardiovascular activity. Similar findings were reported in a subsequent study (Sher & Walitzer, 1986). In sum, substance use appears to be more effective in decreasing negative affect and thus is a more rewarding behavior among people high in impulsivity.
Correlation Research: The Moderating Role of Impulsivity on the Link between Affect and Substance Abuse

Despite the extensive literature examining the relationship of substance use to negative affect and to impulsivity, there is surprisingly little research that investigates the impact of having elevated levels of both traits. Specifically, there is some evidence that suggest that impulsiveness moderates the relationship between negative affect and substance use such that those with negative affect are more likely to report problematic substance use if they are highly impulsive (Simons, 2003). For example, Simons, Carey, and Gaher (2004) examined the relationship of both affective lability (the frequency, speed, and range of changes in affective states) and impulsivity to alcohol use in 592 undergraduate students. Results showed that both psychological characteristics were independently associated with alcohol problems even after controlling for frequency of use. As such, this finding suggests that people high in affective lability and people high in impulsivity tend to experience significantly more alcohol related problems than people low in these characteristics even when drinking just as frequently. Additionally, the authors found that level of impulsivity moderated the relationship between affective lability and alcohol use problems such that the greater the impulsivity, the stronger the association between affective lability and alcohol problems. In other words, the combined impact of affective lability and impulsiveness appears to have a synergistic effect, increasing the risk for problematic substance use above and beyond one or the other.
Impulsivity has also been found to moderate the relationship between depression and alcohol use frequency. Specifically, Hussong and Chassin (1994) found that impulsivity moderated the relationship between depression and alcohol use such that impulsive adolescents who were depressed drank more frequently than adolescents who were just depressed or just impulsive. It should be noted however, that the authors found no such interaction effect when looking at adolescents who were anxious or angry suggesting that these emotions were less vulnerable to the potentiating effects of impulsivity.

Some research, however, has failed to confirm the interactive effects of impulsivity. For example, Colder and Chassin (1997) in their study of 427 adolescents failed to find an interactive effect of impulsivity with regard to negative affectivity (the predisposition to experience negative mood) and alcohol use and alcohol related impairment (social consequences and symptoms of dependency). The authors suggest that this null finding could be due to “negative affectivity” being too broad of a construct and one that did not include relevant components such as sadness. Interestingly, however, the authors did find an interactive effect of impulsivity with regard to positive affectivity and alcohol abuse such that impulsive adolescents who reported low positive affectivity reported higher use of alcohol and alcohol related impairment.

Borderline Personality Disorder and Substance Use

Researchers have extensively examined the substance use patterns of people with borderline personality disorder (BPD), a mental health disorder of which two of the
primary traits are affective instability and impulsivity (American Psychiatric Association, 2000). Some research suggests that affective instability and impulsivity are the primary traits which drive the behavior observed in people with this disorder (Siever & Davis, 1991).

The high comorbidity of borderline personality disorder and substance use disorders (SUD) has been well documented (Feske, Tarter, Kirschki, & Pilkonis, 2006; McGovern, Xie, Segal, Siembab, & Drake, 2006; C. A. Ross & Durkin, 2005; J. Ross et al., 2005; S. Ross, Dermatis, Levounis, & Galanter, 2003; Skodol, Oldham, & Gallagher, 1999). Of particular note, in their comprehensive meta-analysis of 17 studies that examined the rates of substance use disorders in adults with BPD, Trull et al. (2000) found that 57.4% of participants from residential, outpatient, or community samples met criteria for a substance use disorder. More specifically, 48.8% of these participants met criteria for a drug use disorder and 38.0% met criteria for an alcohol use disorder. Trull et al. also examined the rates of BPD in 26 studies of adults diagnosed with substance use disorders in residential, outpatient, and community settings. They found that across all substance use disorders, 27.4% of participants also met criteria for BPD. By substance disorder, the percentages of participants meeting criteria for BPD were as follows: 14.3% for participants meeting criteria for an alcohol use disorder, 16.8% of those meeting criteria for a cocaine use disorder, and 18.5% of those meeting criteria for an opioid use disorder (Trull et al., 2000). It should be noted that in explaining this link, the authors suggest that “the personality traits of affective instability and impulsivity are central to the development of both BPD and SUD and, thus, account for much of the comorbidity
between these disorders” (Trull et al., 2000). Similar conclusions attributing the high comorbidity rates of BPD and SUD to the shared traits of affective instability and/or impulsivity have also been suggested by other authors (Bornavalova et al., 2005; Chabrol et al., 2005; Grilo et al., 1997).

**Patterns of substance use and abuse**

*Typologies of substance users*

The idea that there are certain types of people who are more likely to abuse substances has been investigated for some time. Development of typologies began in the 19th century when asylum physicians began differentiating alcoholics based upon variables such as family history, drinking patterns, medical consequences, and sociocultural factors (Barbor, 1994). Since then there have been numerous typologies offered by researchers.

Although not well supported empirically, one of the more popular theories that attempted to identify substance user typologies was created by E. Morton Jellinek (Jellinek, 1960). According to Jellinek, there are five types of alcoholics (alpha, beta, gamma, delta, and epsilon) which he identified based upon clinical observation of differences in drinking patterns. Of the five types identified, Jellinek believed two were most severe: gamma and delta. Specifically, gamma alcoholics are characterized by physical dependence and an inability to control the frequency or amount of drinking.
Delta alcoholics, on the other hand, are also physically dependent, but are able to control their drinking so that while never sober, they are never severely intoxicated either.

A more recent typology was introduced by Babor et al. (1992). This typology was derived from a cluster analysis of variables including premorbid risk and vulnerability, severity of dependence and alcohol related problems, chronicity and negative alcohol related consequences, and comorbid psychopathology. Two factors emerged from the analysis which the authors refer to as Type A and Type B. Type A alcoholics generally have a later onset, are less dependent on alcohol, have fewer alcohol related problems, have a less chronic course, and have less comorbid psychopathology. On the other hand, Type B alcoholics have an earlier onset, are more severely dependent, have more alcohol related problems, have a more chronic course and have more comorbid psychopathology (Brown, Babor, Litt, & Kranzler, 1994). While this typology has been replicated in subsequent studies using different samples (Brown et al., 1994; Litt, Babor, DelBoca, Kadden, & et al., 1992), it has not shown to be clinically useful (Conrod, 2000).

Another interesting typology, introduced by Cloninger, Bohman, & Sigvardsson (1981), differentiated alcoholics into two groups based upon alcohol related symptoms. According to Cloninger et al., Type 1 alcoholics are people who begin using after 25, are infrequently unable to abstain from use, are less likely to fight or get arrested while drinking, are more likely to be unable to stop drinking once they had started, and display more guilt and fear related to their alcohol dependence. On the other hand, Type 2 alcoholics are people whose age of onset is before 25, are frequently unable to abstain
from use, are more likely to fight or get arrested while drinking, are more able to stop drinking once they had started, and experience less guilt or fear associated with their alcohol use.

Interestingly, after initially separating Type 1 and Type 2 alcoholics on the basis of patterns of use, Cloninger (1987) showed that these typologies also differed with respect to three continuous personality traits, namely novelty seeking, harm avoidance, reward dependence. Specifically, he labeled Type 1 alcoholics as having a passive-dependent or “anxious” personality, characterized by low novelty seeking, high harm avoidance, and high reward dependence. In contrast, Type 2 alcoholics were labeled as having an antisocial personality, characterized as being high in novelty seeking, low in harm avoidance, and low in reward dependence. Cloninger suggests that differences in these personality traits are reflective of differences in neurobiological motivational systems, specifically the behavioral activation system (BAS), the behavioral inhibition system (BIS), and the behavioral maintenance system (BMS). Cloninger felt that inherited differences in each system not only result in making an individual more or less likely to seek out specific drug reinforcement effects, but also have implications for the magnitude of effect a drug can have. As such, he proposed that the observed personality differences in the two typologies of alcoholics actually reflect differences in neurobiological motivational systems that make particular patterns of drinking more rewarding.

Drawing on Cloninger’s work, Conrod, Phil, Stewart, and Dongier (2000) validated an alternative classification system based on personality risk factors and
corresponding motivational determinants of substance use. Specifically, they identified four personality risk factors: anxiety sensitivity, introversion hopelessness, sensation seeking, and impulsivity. With respect to motivational determinants, the authors suggest that people with high anxiety sensitivity choose to use anxiolytic properties in order to reduce anxious symptoms they might be experiencing. The authors suggest that people high in introversion hopelessness are more likely to use analgesic substances to help them deal with the pain of their depression. Due to biochemical theories of novelty/sensation seeking which suggest that people exhibiting these characteristics are more sensitive to the rewarding psychostimulant effects of substances, the authors suggest that people high in sensation seeking are more likely to use alcohol for its psychostimulant properties. Finally, people in the impulsive group are not necessarily more or less likely to use one type of substance over another; however, given that impulsiveness implies an inability to consider the negative consequences of use, people in this group are more likely to be involved in antisocial behavior and suffer problems associated with their drug use (Conrod et al., 2000).

Risk factors for substance abuse in criminal populations

High Risk Personality Traits in Criminal Populations

There is much evidence to suggest that criminals are more likely to exhibit symptoms of mental illness and, hence, many of the characteristics discussed above (i.e.
anxiety and/or depression, impulsivity, or a combination of both (Brink, 2005; Teplin, 1994).

It has long been known that people with mental illness are highly overrepresented in jail populations. For example, a report issued by the Bureau of Justice Statistics showed that data collected from a sample of 417 jails revealed that 60.5% of jail inmates report having symptoms of a mental health disorder (2006). More specifically, this report showed that an estimated 23% of prison inmates and 30% of jail inmates reported symptoms of major depression in the past 12 months. This is especially high given that only about 7.9% of the general population report having experienced depressive symptoms over the same time frame (James & Glaze, 2006). High rates of major depression among prisoners have also been found in other studies (Fazel & Danesh, 2002).

Compared to the general population, people in jail also report higher rates of anxiety and anxiety related disorders as well. In a study of jail detainees, Teplin found that approximately 12% of inmates met current criteria and 21% of inmates met lifetime criteria for an anxiety or somatoform disorder (Teplin, 1994).

Research has shown that jail inmates are far more likely to meet criteria for borderline personality disorder as well. While community sample studies suggest that approximately 2% of people in the general population meet criteria for BPD (American Psychiatric Association, 2000), studies have found that as many as 23% of incarcerated men (Singleton, Meltzer, Gatward, Coid, & Deasy, 1998) and 28% of incarcerated women (Jordan, Schlenger, Fairbank, & Caddell, 1996) meet criteria.
As the research suggests, jail populations are overrepresented with people high in anxiety and/or depression, people high in impulsivity, and people with borderline personality disorder. These findings are important given that, as discussed earlier, these high risk personality traits increase the likelihood of problematic substance use which is often related to, if not the very cause of, criminal behavior (Fazel & Danesh, 2002; Henderson, 1998).

**Substance Abuse and Criminality**

An examination of the literature reveals a high correlation between drug use and criminal behavior. For example, a 1994 report by the Bureau of Justice Statistics (BJS) showed that an analysis of the data collected by the National Household Survey on Drug Abuse supports the finding that people who report having used drugs are significantly more likely to also report having committed a crime. Specifically, people who reported having used cocaine or marijuana over the past year were nearly ten times more likely to also report having committed a violent crime and 14.5 times more likely to also report having committed a property crime than people who reported no substance use (26.1% vs. 2.7% and 24.7% vs. 1.7%, respectively) (Bureau of Justice Statistics, 1994). The connection between drug use and criminality is also revealed in the BJS analysis of the 1994 National Crime Victimization Survey. In this survey, 59% of crime victims that were able to determine whether the offender was or was not under the influence of drugs or alcohol while committing the crime, reported that the offender was under the influence (BJS, 1994). The high rate of alcohol and substance intoxication in offenders as
identified by victims is also underscored by an analysis of data provided by the Drug Use Forecasting (DUF) Program which measures drug use among people arrested by way of urine drug screens. The data collected by this program show that a majority of those arrested for drug sale/possession, burglary, robbery, larceny, and stolen property test positive for an illegal substance (BJS, 1994). In another study, Brecht, Anglin and Lu (2003) used data from the Arrestee Drug Abuse Monitoring (ADAM) program, the census, Uniform Crime Reports, and the California Monthly Arrest and Citation Register to estimate that approximately 65% of all people arrested in the United States in 2000 were found to have used an illegal substance within three days prior to committing a crime (Brecht, Anglin, & Lu, 2003). The magnitude of this number becomes clear when compared to data from the National Household Survey on Drug Abuse which estimates that only 6.3% of the population used an illegal drug in the past month in 2000 (Substance Abuse and Mental Health Services Administration, 2001). While one cannot assume from the results of these studies that drug use actually causes more criminal behavior, it nevertheless underlines the significant relationship between the two variables.

Criminals themselves also report significant drug and alcohol use. In a study conducted at a Massachusetts correctional facility, it was found that of the inmates who reported using alcohol within the three months prior to their arrest (66% of men and 60% of women), 33% admitted to drinking daily and 75% admitted to regular binge drinking (Conklin, Lincoln, & Thomas, 2003). Furthermore, of the inmates who reported ever having used drugs (66%), 70% of women and 50% of men admitted to having had confrontations with the law due to drug use, having a drug problem, having prior drug
treatment, or wanting help with their drug problem (Conklin et al., 2003). From these findings, it can be inferred that a significant number of inmates have problems with either drug or alcohol abuse and, consequently, that these problems likely had an influence on their criminal behavior.

Another way to describe the severity of substance abuse problems in criminal populations is to clinically assess inmates currently in prison and jail. In fact, many inmates meet full diagnostic criteria for either substance abuse or dependence. In a study of 728 male jail detainees in Chicago, IL, researchers found that 29.1% of detainees met criteria for a substance use disorder (SUD) as defined by the National Institute of Mental Health. Furthermore, 61.3% of detainees met criteria for an SUD at some point during their lifetime (Teplin, 1994). As this data illustrates, there is a high prevalence of SUDs among people incarcerated.

The importance of widespread SUDs in offenders is apparent when one considers the fact that many of the crimes committed by drug users are committed in order to support their drug habit. In a national survey of inmates, 17% of state prison inmates in 1991 and 13% of convicted jail inmates in 1989 reported that the reason they had committed the offence they were incarcerated for was to obtain money in order to support their drug habits (BJS, 1994). As these statistics clearly show, drug and alcohol dependence have a significant influence on criminal behavior.

The assertion that drug and alcohol abuse increase the risk for criminal behavior is important considering that many of those who suffer from SUDs are likely to have not received treatment for disorder. In the 2000 annual report on Arrestee Drug Abuse
Monitoring compiled by the National Institute of Justice, it was found that although 64% of male arrestees tested positive for an illegal substance, very few had recently been in treatment. Specifically, only between 4 and 17% of those testing positive had received residential treatment in the previous year and only between 2 and 15% had received outpatient treatment in the previous year (National Institute of Justice, 2000).

In summary, criminals are more likely to exhibit personality traits that put them at risk for problematic substance abuse. The literature shows that problematic substance use is also often at the root of criminal behavior. As such, it is important to discern whether these personality risk factors do indeed influence substance use patterns and, if so, whether they influence substance use in different degrees.

**Research Questions**

The results of this study will supplement existing research by demonstrating the link between high risk personality traits and increased substance use both in the year prior to and year after incarceration in jail populations. This study also hopes to add to the literature by showing that different high risk personality traits lead to different patterns of substance use. The research questions and hypotheses of this study are as follows:

**Research Question 1:** Do inmates with high risk personality characteristics (high anxiety or depression, high impulsivity, or high borderline features) report significantly greater
problems with substance use\(^1\) in the year prior to incarceration than inmates without these characteristics?

_Hypothesis:_ Inmates who are high in any of the high risk personality characteristics will have had significantly greater substance use problems than inmates who are low in high risk personality characteristics.

**Research Question 2:** Do inmates with particular high risk personality characteristics have significantly greater problems with substance use in the year prior to incarceration than inmates with other high risk personality characteristics?

_Hypothesis:_ Participants with high borderline features will have had significantly greater substance use problems than inmates with high anxiety/depression or inmates with high impulsivity. Also, both inmates with high impulsivity or high borderline features will have used significantly more different substances than inmates with high anxiety/depression.

**Research Question 3:** Do inmates with high risk personality characteristics have significantly greater substance dependence in the year prior to incarceration than inmates without these characteristics after controlling for frequency of substance use?

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\(^1\) For ease of discussing the substance use variables tested collectively, throughout this paper the terms “substance use problems” or “problems with substance use” will refer to 1) the age first started using, 2) the number of different types of drugs used, 3) substance use frequency, and 4) severity of substance dependence.
*Hypothesis*: Inmates with high risk personality characteristics will report significantly greater substance dependence above and beyond what is accounted for by frequency of use when compared to a control group.

**Research Question 4**: Do inmates with particular high risk personality characteristics have significantly greater substance dependence in the year prior to incarceration than inmates with other high risk personality characteristics after controlling for frequency of substance use?

*Hypothesis*: Inmates high in borderline features will have had significantly greater substance dependence above and beyond what is accounted for by frequency of use when compared to inmates with other high risk personality characteristics.

**Research Question 5**: Do inmates with different high risk personality characteristics differ with respect to their vulnerability to developing alcohol versus drug dependence?

*Hypothesis*: Inmates in the different high risk groups will indeed differ with respect to their vulnerability to developing alcohol versus drug dependence. Specifically, inmates high in anxiety/depression will have significantly greater alcohol versus drug dependence relative to inmates with other high risk characteristics. Inmates high in impulsivity will have significantly greater drug versus alcohol dependence relative to inmates with other high risk characteristics. Finally, inmates high in borderline features will be equally prone to developing both alcohol and drug dependence relative to other inmates with high risk characteristics.
Research Question 6: Do inmates with high risk personality characteristics have significantly greater problems with substance use in the year after incarceration than inmates without these characteristics?

Hypothesis: Inmates with high risk personality characteristics will have had significantly greater substance use problems than inmates who are low in high risk personality characteristics.

Research Question 7: Do inmates with particular high risk personality characteristics have significantly greater problems with substance use in the year after incarceration than inmates with other high risk personality characteristics?

Hypothesis: Participants with high borderline features will have had significantly greater substance use problems than inmates with high anxiety/depression or inmates with high impulsivity. Also, inmates with high impulsivity will have used significantly more different substances than inmates with high anxiety/depression.
METHODS

Description

The aim of this study is to assess the pre-incarceration and post-incarceration alcohol and drug use patterns of three groups of jail inmates defined by personality characteristics highlighted in motivational models of substance abuse. The analysis will determine whether these groups have greater problems with substance use than inmates without these characteristics, which of these groups display the greatest problems with substance use, and whether the patterns of substance use differ between groups with respect to alcohol use versus drug use.

Participants

Participants for this project were 312 inmates at the Fairfax County Adult Detention Center (ADC) recruited as part of the existing NIDA funded project, The GMU Inmate Study. Located in suburban Virginia, the ADC houses approximately 900-1000 pretrial and post-trial individuals who have been charged and/or convicted of a variety of misdemeanor and felony offenses. With regards to demographic characteristics of the sample selected for this study, 69.2% of the inmates are male and 30.8% are female. With respect to race, 39.4% are Caucasian, 41.7% are African-American, 8% are Latino,
3.2% are Asian, and 7.6% are other/mixed. The mean age of participants was 32.1 (range = 18-70; SD = 10). Typically, inmates sentenced to a year or more are transferred to the Department of Corrections (DOC), but due to overcrowding, many complete a substantial portion of their time at the ADC.

The targeted population was inmates who would serve at least 4 months in jail. Selection criteria were (1) either (a) sentenced to a term of 4 months or more, or (b) arrested and held on at least one felony charge other than probation violation, with no bond or greater than $7,000 bond, (2) assigned to the jail’s medium and maximum security “general population” (e.g., not in solitary confinement, not in a separate forensics unit for actively psychotic inmates), and (3) sufficient language proficiency to complete study protocols in English or Spanish. Eligible inmates were provided with a description of the study and were asked to participate, with assurance of the voluntary and confidential nature of the project. The principal investigator obtained a Certificate of Confidentiality from DHHS to ensure the confidentiality of the data collected as part of the study.

Measures

Clinically significant levels of anxiety, depression, and borderline personality disorder characteristics were determined using several subscales of the Personality Assessment Inventory (PAI; Morey, 1991). The PAI is a 344 item self-report measure of psychopathology and personality traits. For each item, respondents were asked to indicate the degree to which they agree with a statement based on four response choices, “False,”
“Sometimes True,” “Mainly True,” and “Very True.” These items were combined to form 11 clinical scales, four validity scales, five treatment scales, and two interpersonal scales. The 11 PAI clinical scales were developed by identifying those core symptoms or behaviors indicative of the clinical disorders based on review of the literature, and, thus, reflect the core components of many mental disorders identified in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.

This project will focus on the PAI subscales of depression (DEP), anxiety (ANX), anxiety related disorders (ARD), and borderline features (BPD) each of which are comprised of three to four subscales highlighting specific symptoms indicative of clinical pathology. The anxiety related disorders subscale assesses for criteria that is diagnostic of three anxiety related disorders: obsessive compulsive disorder, general phobias, and post-traumatic stress disorder. Appendix A lists PAI items used in this study. The raw scores for each clinical scale were transformed to T-scores (M=50, SD=10), which can be compared to census norms to determine the prevalence of clinically significant symptoms of various mental health concerns.

The PAI clinical scales have demonstrated good reliability and validity (Morey, 1991). The clinical scales chosen for this study have been shown to have high internal consistency across a variety of populations (α = .76-.90 for a census matched normative sample, α = .80-.89 for a college student sample, and α = .86-.94 for a clinical sample). Test-retest reliability for these variables has also shown to be high (α = .85-.90 for a census matched sample, α = .82-.88 for a college student sample, and α = .83-.88 for a clinical sample) (Morey, 1991). The PAI has also demonstrated good convergent and
discriminant validity. For example, research has shown that the anxiety scale is strongly correlated with the neuroticism subscale of the NEO-PI (r = .76), the Beck Anxiety Inventory (r = .62), and both state (r = .62) and trait (r = .73) measures of the State-Trait Anxiety Inventory. The Depression scale is strongly correlated with the Beck Depression Inventory (r = .80) and the MMPI-2 Depression scale (r = .81) (Morey, 1991).

Three items from the Hare Psychopathy Checklist – Screening Version (PCL-SV; Hare, Harpur, Hakstian, Forth, & Hart, 1990) were used to assess the level of impulsive lifestyle characteristics. The PCL-SV is a valid and reliable measure of psychopathy among offenders, capturing all of the essential elements of the full PCL-R in a shorter format (Cooke, Michie, Hart, & Hare, 1999). Completion of this measure requires conducting in-depth interviews with participants covering (1) nature and circumstances surrounding instant (or alleged) offense; (2) the inmate’s perceptions of the consequences of the offense (of his/her related behavior) for others (e.g. What were the consequences? When did he/she become aware of them? How did this awareness affect his/her feelings?), and (3) background information concerning the inmate’s occupational, academic, and social/interpersonal functioning up to the time of the instant offense. With the participant’s permission, these interviews were videotaped for coding. In addition, inmates who decided to participate agreed to an examination of their criminal background provided by ADC records. This information was used by trained clinicians to code the PCL-SV, which provided a total psychopathy score as well as two factor scores. The three items relevant to this study were those that compose the impulsive lifestyle facet of the four factor model and include: impulsivity, lack of goals, and irresponsibility (Hare,
Research has shown that the impulsive lifestyle facet of the four factor model demonstrates good internal consistency across a variety of criminal populations ($\alpha = .67$ for male offenders, $\alpha = .64$ for female offenders, and $\alpha = .65$ for male forensic psychiatric patients) and has shown acceptable inter-rater reliability ($r = .75$ for male offenders, $r = .76$ for female offenders, and $r = .87$ for male forensic psychiatric patients) (Hare, 2003). The four factor model has also been validated via confirmatory factor analysis (Hill, Neumann, & Rogers, 2004).

Relevant portions of Simpson and Knight’s (1998) Texas Christian University-Correctional Residential Treatment Form, Initial Assessment (TCU-CRTF) were used to measure the age of first substance use, the number of different drugs used in the year prior to incarceration, frequency of substance use, and severity of substance dependence. Appendix B provides a list of all TCU-CRTF items.

With respect to number of different drugs used in the year prior to incarceration, participants were asked to report their frequency of use of the following substances in the past year: alcohol, marijuana, cocaine, opiates, speedballs, inhalants, amphetamines, hallucinogens, ecstasy, and sedatives. Item responses ranged from 0 = “never” to 8 = “more than once a day.” A variable was created that counted for each participant the number of different substances he or she used more than “never.” These items were also used to measure the frequency of participants’ alcohol, marijuana, opiate, and cocaine use during the 12 months following their incarceration in an interview conducted one year post-release.
Variables were also created to assess each participant’s severity of dependence on alcohol, marijuana, cocaine, and opiates. As speedballs, inhalants, amphetamines, hallucinogens, ecstasy, and sedatives are generally used by a smaller percentage of the population, information on severity of dependence for these substances was not collected. On the TCU-CRTF, there are scales composed of items that assess each of the DSM-IV (APA, 2000) substance dependence domains (e.g. tolerance, withdrawal, substance taken in larger amounts or over longer period than intended, etc.). Item responses within each domain range from 0 = “never” to 4 = “7 or more times.” For domains with multiple items, responses were averaged. A total severity of dependence score was computed for each substance by taking the mean across DSM-IV substance dependence domains for that substance. Thus, higher scores on a dependence scale indicate a higher likelihood of meeting DSM-IV diagnostic criteria for dependence on that particular substance. In addition to the severity of substance dependence variables created for each of the four substances, a fifth variable, “most severe drug dependence,” was created by selecting the maximum severity of substance dependence score (i.e. marijuana, cocaine, or opiates) for each participant. In the current study, data indicated high reliability for continuous scales assessing substance dependence (alphas above .84).

Additional descriptive statistics on the variables used in this study can be found in Table 1. Means and standard deviations for group defining variables can be found in Table 2.
<table>
<thead>
<tr>
<th>Variable Used to Create Groups</th>
<th>Number of Items</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Possible Range</th>
<th>Actual Range</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAI – Anxiety Scale</td>
<td>24</td>
<td>57.9</td>
<td>12.5</td>
<td>34-103</td>
<td>35-100</td>
<td>0.90</td>
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<tr>
<td>PAI – Anxiety Related Disorders Scale</td>
<td>24</td>
<td>60.9</td>
<td>13.5</td>
<td>26-113</td>
<td>32-95</td>
<td>0.76</td>
</tr>
<tr>
<td>PAI – Depression Scale</td>
<td>24</td>
<td>61.2</td>
<td>14.0</td>
<td>35-111</td>
<td>35-107</td>
<td>0.87</td>
</tr>
<tr>
<td>PAI – Borderline Scale</td>
<td>24</td>
<td>66.9</td>
<td>14.0</td>
<td>32-104</td>
<td>38-95</td>
<td>0.87</td>
</tr>
<tr>
<td>HARE – Impulsive Lifestyle Scale</td>
<td>N/A</td>
<td>3.1</td>
<td>1.6</td>
<td>0-6</td>
<td>0-6</td>
<td>0.67</td>
</tr>
<tr>
<td>Age First Started Using Alcohol</td>
<td>1</td>
<td>15.1</td>
<td>3.4</td>
<td>N/A</td>
<td>5-27</td>
<td>N/A</td>
</tr>
<tr>
<td>Earliest Drug</td>
<td>3</td>
<td>15.4</td>
<td>4.4</td>
<td>N/A</td>
<td>8-43</td>
<td>N/A</td>
</tr>
<tr>
<td>Marijuana</td>
<td>1</td>
<td>15.1</td>
<td>3.6</td>
<td>N/A</td>
<td>8-43</td>
<td>N/A</td>
</tr>
<tr>
<td>Cocaine</td>
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<td>21.1</td>
<td>5.7</td>
<td>N/A</td>
<td>12-43</td>
<td>N/A</td>
</tr>
<tr>
<td>Opiates</td>
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<td>6.8</td>
<td>N/A</td>
<td>9-42</td>
<td>N/A</td>
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<tr>
<td>Number of Different Substances Used</td>
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<td>2.1</td>
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<td>0-9</td>
<td>N/A</td>
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<tr>
<td>Frequency of Substance Use</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>Alcohol</td>
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<td>2.4</td>
<td>0-8</td>
<td>0-8</td>
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</tr>
<tr>
<td>Marijuana</td>
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<td>2.1</td>
<td>2.7</td>
<td>0-8</td>
<td>0-8</td>
<td>N/A</td>
</tr>
<tr>
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</tr>
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<td>Opiates</td>
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<td>1.3</td>
<td>2.6</td>
<td>0-8</td>
<td>0-8</td>
<td>N/A</td>
</tr>
<tr>
<td>Severity of Dependency Alcohol</td>
<td>17</td>
<td>0.8</td>
<td>1.1</td>
<td>0-4</td>
<td>0-4</td>
<td>0.92</td>
</tr>
<tr>
<td>Most Severe Drug</td>
<td>N/A</td>
<td>1.6</td>
<td>1.6</td>
<td>0-4</td>
<td>0-4</td>
<td>N/A</td>
</tr>
<tr>
<td>Marijuana</td>
<td>8</td>
<td>0.6</td>
<td>1.0</td>
<td>0-4</td>
<td>0-4</td>
<td>0.91</td>
</tr>
<tr>
<td>Cocaine</td>
<td>14</td>
<td>1.2</td>
<td>1.5</td>
<td>0-4</td>
<td>0-4</td>
<td>0.97</td>
</tr>
<tr>
<td>Opiates</td>
<td>17</td>
<td>0.5</td>
<td>1.2</td>
<td>0-4</td>
<td>0-4</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Note: PAI means, standard deviations and ranges expressed in t-scores
Table 2. Means and Standard Deviations for Group Defining Variables

<table>
<thead>
<tr>
<th></th>
<th>Low Symptom Control Mean (SD)</th>
<th>Emotional Pain Mean (SD)</th>
<th>Impulsive Lifestyle Mean (SD)</th>
<th>Borderline Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAI – Anxiety Scale</td>
<td>47.1 (5.7)</td>
<td>59.7 (9.9)</td>
<td>49.5 (6.3)</td>
<td>65.1 (11.5)</td>
</tr>
<tr>
<td>PAI – Anxiety-Related Disoders Scale</td>
<td>48.3 (6.7)</td>
<td>69.0 (7.6)</td>
<td>53.8 (8.2)</td>
<td>67.5 (12.6)</td>
</tr>
<tr>
<td>PAI – Depression</td>
<td>47.7 (5.5)</td>
<td>65.1 (13.0)</td>
<td>53.0 (6.3)</td>
<td>69.3 (12.1)</td>
</tr>
<tr>
<td>PAI – Borderline Features</td>
<td>49.9 (5.7)</td>
<td>62.7 (6.1)</td>
<td>58.6 (6.8)</td>
<td>78.7 (6.2)</td>
</tr>
<tr>
<td>PCL-SV – Impulsive Lifestyle Facet</td>
<td>1.4 (0.5)</td>
<td>2.5 (1.2)</td>
<td>5.2 (0.4)</td>
<td>3.6 (1.3)</td>
</tr>
</tbody>
</table>
Procedure

The data were collected in two phases. The first phase began approximately one week following the inmate’s assignment to the jail’s “general population” (e.g., following booking and screening). Phase 1 consisted of four interview sessions. Interviews were conducted in the privacy of the professional visiting rooms used by attorneys. During Session 1 (approximately 1 hour), GMU interviewers reviewed informed consent procedures, obtained written consent, and conducted a brief social history interview with study participants. During Sessions 2 and 3 (approximately 1 hour each), participants, using “touch-screen” computers, completed computer-based questionnaires, including the Personality Assessment Inventory (PAI; Morey, 1991) and Texas Christian University - Correctional Residential Treatment Form, Initial Assessment (TCU-CRTF; Simpson & Knight, 1998). Session 4 (approximately 2-3 hours) consisted of an in-depth semi-structured interview. GMU researchers used information collected during the semi-structured clinical interview as well as supplementary information (i.e. NCIC-III criminal history records and the jail’s classification files) to score the Psychopathy Checklist: Screening Version (PCL-SV; Hare et al., 1990). Participants were also asked to provide information on how best to re-contact them for additional data collection following their release from jail or prison, including phone numbers, addresses, as well as the contact information of people who might know their whereabouts (family, friends, places of business). Those inmates who agreed to participate and completed all four sessions of the first phase of interviews received an $18 dollar honorarium.
During the second phase of data collection, participants were contacted by phone one year following their release from jail or prison and administered, among other measures, a modified version of the TCU-CRTF referring to substance use patterns during the year after release from jail or prison. If the participant was re-incarcerated at the time of Phase 2 data collection, efforts were made to conduct the interview in-person at the participant’s correctional facility. Due to difficulties associated with finding participants and scheduling interviews, researchers were given a six-month window starting from the one year post-release date to complete Phase 2 interviews. All data collected, regardless of the actual Phase 2 interview date, referred only to the first 12 months following release from jail or prison. If the participant had spent any time during that one year period incarcerated, he or she was asked to disregard that time when answering questions about substance use. For example, if the participant was released from jail on May 1, 2002 and then re-incarcerated on January 1, 2003, questions regarding number of different substances used, frequency of substance use, and severity of substance dependence referred only to the eight month period the participant spent in the community between May 1, 2002 and January 1, 2003.

**Group Membership**

For this study, participants were divided into four groups: Emotional Pain (EP), Impulsive Lifestyle (IL), Borderline Personality (BOR), and Low Symptom Control (LSC) following the criteria described in Table 3.
<table>
<thead>
<tr>
<th>Group</th>
<th>Criteria</th>
<th>Group Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Pain (EP)</td>
<td>- A T-score of 70 or greater on DEP, ANX, or ARD (PAI)</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>- Does not meet criteria for IL or BOR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- A total score of 5 or greater on the Impulsive, Lacks Goals, and Irresponsible items (PCL: SV)</td>
<td></td>
</tr>
<tr>
<td>Impulsive Lifestyle (IL)</td>
<td>- Does not meet criteria for EP or BOR</td>
<td>38</td>
</tr>
<tr>
<td>Borderline (BOR)</td>
<td>- A T-score of 70 or greater on BOR (PAI)</td>
<td>159</td>
</tr>
<tr>
<td>Low Symptom Control (LSC)</td>
<td>- A T-score of 60 or less on DEP, ANX, ARD, and BOR (PAI)</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>- A total score of 2 or less on the Impulsive, Lacks Goals, Irresponsible items (PCL: SV)</td>
<td></td>
</tr>
</tbody>
</table>
RESULTS

Substance Use in the Year Prior to Incarceration: High Risk Groups vs. Control Group

The first hypothesis was that inmates in the three high risk groups would have significantly greater problems with substance use in the year prior to incarceration than inmates without these characteristics.

To answer this question, a series of pairwise comparisons were conducted to explore the differences in substance use characteristics during the year prior to incarceration between the high risk groups and the low symptom control group. The substance use variables examined were as follows: the age first started using (alcohol, earliest drug, marijuana, cocaine, opiates), the number of different types of substances used during the year prior to incarceration, substance use frequency (alcohol, marijuana, cocaine, opiates), and severity of substance dependence (alcohol, most severe drug dependence, marijuana, cocaine, opiates). For each variable, the pairwise comparisons were used to compare the low symptom control group to all three of the high risk groups as a set, and the low symptom control group to each of the high risk groups individually. Means and standard deviations can be found in Table 4 and a summary of the pairwise contrast t-values can be found in Table 5\(^2\).

\(^2\) Due to non-normality of some variables, variables were transformed logarithmically and the analyses for this and subsequent questions were re-run. In all, the transformations had no substantial impact on the results, so only results using the original non-transformed variables are presented here.
Table 4. Means and Standard Deviations for Substance Use Variables During the Year Prior to Incarceration

<table>
<thead>
<tr>
<th></th>
<th>Low Symptom Control</th>
<th>Emotional Pain</th>
<th>Impulsive Lifestyle</th>
<th>Borderline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean (SD)</td>
<td>N</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Age First Started Using</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>75</td>
<td>17.3 (3.1)</td>
<td>31</td>
<td>15.3 (2.3)</td>
</tr>
<tr>
<td>Earliest Drug</td>
<td>57</td>
<td>17.2 (4.4)</td>
<td>29</td>
<td>17.1 (5.8)</td>
</tr>
<tr>
<td>Marijuana</td>
<td>56</td>
<td>16.9 (3.1)</td>
<td>29</td>
<td>17.1 (5.8)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>28</td>
<td>22.5 (6.2)</td>
<td>14</td>
<td>23.3 (7.8)</td>
</tr>
<tr>
<td>Opiates</td>
<td>13</td>
<td>25.0 (8.6)</td>
<td>7</td>
<td>23.7 (8.6)</td>
</tr>
<tr>
<td>Number of Different Types of Substances Used</td>
<td>81</td>
<td>0.9 (1.2)</td>
<td>32</td>
<td>1.3 (1.5)</td>
</tr>
<tr>
<td>Substance Use Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>83</td>
<td>2.7 (2.0)</td>
<td>32</td>
<td>3.3 (2.3)</td>
</tr>
<tr>
<td>Marijuana</td>
<td>83</td>
<td>1.1 (2.0)</td>
<td>32</td>
<td>2.1 (3.0)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>83</td>
<td>0.8 (1.9)</td>
<td>32</td>
<td>1.3 (2.5)</td>
</tr>
<tr>
<td>Opiates</td>
<td>83</td>
<td>0.6 (2.0)</td>
<td>32</td>
<td>0.7 (2.3)</td>
</tr>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>81</td>
<td>0.4 (0.8)</td>
<td>31</td>
<td>0.6 (0.8)</td>
</tr>
<tr>
<td>Most Severe Drug Dep.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marijuana</td>
<td>81</td>
<td>0.5 (1.1)</td>
<td>32</td>
<td>1.1 (1.4)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>81</td>
<td>0.1 (0.3)</td>
<td>31</td>
<td>0.5 (1.1)</td>
</tr>
<tr>
<td>Opiates</td>
<td>81</td>
<td>0.4 (1.0)</td>
<td>32</td>
<td>0.7 (1.3)</td>
</tr>
</tbody>
</table>
Table 5. T-Values of Pairwise Comparisons Examining Differences Between High Risk Groups and Low Symptom Control Group: Substance Use During the Year Prior to Incarceration

<table>
<thead>
<tr>
<th>Age First Started Using</th>
<th>Contrast 1: All vs. LSC</th>
<th>Contrast 2: EP vs. LSC</th>
<th>Contrast 3: IL vs. LSC</th>
<th>Contrast 4: BOR vs. LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>-6.0**</td>
<td>-3.0**</td>
<td>-4.9**</td>
<td>-6.8**</td>
</tr>
<tr>
<td>Earliest Drug</td>
<td>-2.6**</td>
<td>-0.1</td>
<td>-2.8**</td>
<td>-4.1**</td>
</tr>
<tr>
<td>Marijuana</td>
<td>-2.9**</td>
<td>0.2</td>
<td>-4.6**</td>
<td>-5.5**</td>
</tr>
<tr>
<td>Cocaine</td>
<td>-0.8</td>
<td>0.4</td>
<td>-1.4</td>
<td>-1.5</td>
</tr>
<tr>
<td>Opiates</td>
<td>-1.4</td>
<td>-0.3</td>
<td>2.3*</td>
<td>-1.5</td>
</tr>
</tbody>
</table>

| Number of Different Types of Substances Used | 6.4** | 1.5 | 4.4** | 8.5** |

<table>
<thead>
<tr>
<th>Substance Use Frequency</th>
<th>Contrast 1: All vs. LSC</th>
<th>Contrast 2: EP vs. LSC</th>
<th>Contrast 3: IL vs. LSC</th>
<th>Contrast 4: BOR vs. LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>2.7**</td>
<td>1.3</td>
<td>1.9</td>
<td>3.7**</td>
</tr>
<tr>
<td>Marijuana</td>
<td>3.9**</td>
<td>1.8</td>
<td>2.5*</td>
<td>4.9**</td>
</tr>
<tr>
<td>Cocaine</td>
<td>5.1**</td>
<td>1.1</td>
<td>3.8**</td>
<td>7.2**</td>
</tr>
<tr>
<td>Opiates</td>
<td>2.2*</td>
<td>0.2</td>
<td>1.5</td>
<td>3.9**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Severity of Dependence</th>
<th>Contrast 1: All vs. LSC</th>
<th>Contrast 2: EP vs. LSC</th>
<th>Contrast 3: IL vs. LSC</th>
<th>Contrast 4: BOR vs. LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>3.4**</td>
<td>1.0</td>
<td>1.2</td>
<td>6.7**</td>
</tr>
<tr>
<td>Most Severe Drug Dep.</td>
<td>7.1**</td>
<td>1.9</td>
<td>5.1**</td>
<td>9.9**</td>
</tr>
<tr>
<td>Marijuana</td>
<td>5.5**</td>
<td>1.9</td>
<td>3.0**</td>
<td>7.2**</td>
</tr>
<tr>
<td>Cocaine</td>
<td>5.5**</td>
<td>1.4</td>
<td>3.8**</td>
<td>7.7**</td>
</tr>
<tr>
<td>Opiates</td>
<td>2.4*</td>
<td>0.6</td>
<td>1.1</td>
<td>4.1**</td>
</tr>
</tbody>
</table>

Note: LSC = Low Symptom Control Group; All = All high risk groups; EP = Emotional Pain Group; IL = Impulsive Lifestyle Group; BOR = Borderline Personality Group
* p < .05  ** p < .01
Consistent with the hypothesis, pairwise comparisons showed that the high risk groups as a set reported significantly greater substance use and symptoms of dependence than the low symptom control group. Group differences were significant for all variables except the age of first cocaine use and the age of first opiate use. It is likely that significance was not obtained for these variables given the smaller sample sizes. (Relatively few participants reported using cocaine and opiates, resulting in smaller ns for age analyses associated with these substances.) Overall, participants in the high risk groups together had used more different types of drugs in the year prior to incarceration, used substances more frequently, and reported greater severity of substance dependence, relative to the low symptom control group.

Pairwise comparisons between the low symptom control group and each clinical group individually also revealed significant differences. Specifically, the borderline group demonstrated significantly greater substance use than the low symptom control group on nearly all variables. The impulsive group showed generally the same pattern as the borderline group when compared to the low symptom control group although there were slightly fewer significant effects. Contrary to the hypothesis, however, the emotional pain group did not differ significantly from the low symptom control group on any of the drug use variables except for age of first alcohol use. Given the extensive research showing that depression and anxiety are highly correlated with substance use, this finding is particularly surprising.

Substance Use in the Year Prior to Incarceration: Comparison Among High Risk Groups
The second hypothesis was that inmates from the borderline group would have significantly greater substance use problems than inmates from the other high risk groups. Also, it was anticipated that participants in the impulsive lifestyle group would have started using substances at an earlier age and would have used significantly more types of substances in the past year than participants in the emotional pain group.

A series of pairwise comparisons were conducted to explore differences in the substance use patterns during the year prior to incarceration among the high risk groups, excluding the low symptom control group. The comparisons were run on the same dependent variables described in the previous analyses and were used to compare each of the high risk groups to one another. Means and standard deviations can be found in Table 4 and a summary of the pairwise pairwise t-values can be found in Table 6.
Table 6. T-Values of Pairwise Comparisons Examining Differences Between High Risk Groups: Substance Use During the Year Prior to Incarceration

<table>
<thead>
<tr>
<th></th>
<th>Contrast 1: EP vs. IL</th>
<th>Contrast 2: EP vs. BOR</th>
<th>Contrast 3: IL vs. BOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age First Started Using</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>1.4</td>
<td>1.7</td>
<td>-0.1</td>
</tr>
<tr>
<td>Earliest Drug</td>
<td>2.2*</td>
<td>3.0**</td>
<td>0.3</td>
</tr>
<tr>
<td>Marijuana</td>
<td>2.5*</td>
<td>2.6*</td>
<td>0.3</td>
</tr>
<tr>
<td>Cocaine</td>
<td>1.6</td>
<td>1.7</td>
<td>-0.2</td>
</tr>
<tr>
<td>Opiates</td>
<td>1.7</td>
<td>1.0</td>
<td>-1.4</td>
</tr>
<tr>
<td>Number of different types of substances Used</td>
<td>-2.7**</td>
<td>-4.4**</td>
<td>-0.6</td>
</tr>
<tr>
<td>Substance Use Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>-0.5</td>
<td>-1.2</td>
<td>-0.6</td>
</tr>
<tr>
<td>Marijuana</td>
<td>-0.4</td>
<td>-0.9</td>
<td>-0.5</td>
</tr>
<tr>
<td>Cocaine</td>
<td>-2.1*</td>
<td>-3.5**</td>
<td>-0.8</td>
</tr>
<tr>
<td>Opiates</td>
<td>-1.0</td>
<td>-2.4*</td>
<td>-1.2</td>
</tr>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>-0.2</td>
<td>-3.6**</td>
<td>-3.7**</td>
</tr>
<tr>
<td>Most Severe Drug Dep.</td>
<td>-2.1*</td>
<td>-4.1**</td>
<td>-1.6</td>
</tr>
<tr>
<td>Marijuana</td>
<td>-0.2</td>
<td>-1.6</td>
<td>-1.8</td>
</tr>
<tr>
<td>Cocaine</td>
<td>-1.9</td>
<td>-3.7**</td>
<td>-1.2</td>
</tr>
<tr>
<td>Opiates</td>
<td>-0.3</td>
<td>-2.2*</td>
<td>-1.9</td>
</tr>
</tbody>
</table>

Note: EP = Emotional Pain Group; IL = Impulsive Lifestyle Group; BOR = Borderline Personality Group
* p < .05  ** p < .01
As can be seen in Table 6, consistent with the hypothesis the borderline group reported generally greater problems with substance use than the emotional pain group. Specifically, the borderline group began using drugs earlier (“earliest drug use”) and began using marijuana, specifically, earlier, relative to the emotional pain group. The borderline group also had used a wider range of drugs in the year prior to incarceration, had been using both cocaine and opiates more frequently, and reported more severe drug dependence (“most severe drug dep.”) as well as more severe dependence with respect to alcohol, cocaine, and opiates, compared to the emotional pain group. It should be noted that while non-significant, the borderline group demonstrated greater problems on all other variables as well.

Contrary to the hypothesis, there were almost no differences in substance use patterns between the impulsive group and the borderline group. In fact, the only significant difference was that participants in the borderline group reported significantly greater severity of dependence on alcohol than participants from the impulsive group.

Consistent with the hypothesis, the participants in the impulsive group used significantly more types of substances than those in the emotional pain group in the year prior to incarceration. Additionally, the impulsive group began using drugs at an earlier age (“Earliest Drug”) than the emotional pain group, however, no differences were found with respect to the age of alcohol use onset between the two groups.

*Substance Dependence Controlling for Frequency of Use: High Risk Groups vs. Control Group*
The third hypothesis was that the high risk groups as a set, and each of the high risk groups individually, would have greater severity of dependence than the low symptom control group even after controlling for frequency of use. Greater dependence beyond what is accounted for by frequency of use would suggest that these groups are somehow more vulnerable to substance use problems than others.

A series of analyses of covariance were completed to determine whether the observed significant differences in dependence severity (described above) held after controlling for frequency of substance use. For each of the ANCOVAs, the independent variable was group (low symptom control group and the three high risk groups). The dependent variables were severity of dependence on alcohol, marijuana, cocaine, or opiates. Participant’s frequency of use of the corresponding substance was used as a covariate. Pairwise comparisons were used to compare the low symptom control group to the three high risk groups as a set and the low symptom control group to each of the high risk groups individually after controlling for frequency of use. Adjusted means and standard errors can be found in Table 7 and a summary of the pairwise contrast t-values can be found in Table 8.
Table 7. Adjusted Means and Standard Error for Severity of Dependence After Controlling for Frequency of Use

<table>
<thead>
<tr>
<th></th>
<th>Emotional Pain</th>
<th>Impulsive Lifestyle</th>
<th>Borderline</th>
<th>Low Symptom Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean (SE)</td>
<td>N</td>
<td>Mean (SE)</td>
</tr>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>31</td>
<td>0.61 (0.15)</td>
<td>36</td>
<td>0.55 (0.14)</td>
</tr>
<tr>
<td>Marijuana</td>
<td>31</td>
<td>0.47 (0.13)</td>
<td>37</td>
<td>0.50 (0.12)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>32</td>
<td>1.16 (0.13)</td>
<td>37</td>
<td>1.23 (0.12)</td>
</tr>
<tr>
<td>Opiates</td>
<td>32</td>
<td>0.58 (0.09)</td>
<td>37</td>
<td>0.48 (0.08)</td>
</tr>
</tbody>
</table>

Table 8. T-Values of Pairwise Comparisons Examining Severity of Dependence After Controlling for Frequency of Use

<table>
<thead>
<tr>
<th></th>
<th>Contrast 1: All vs. LSC</th>
<th>Contrast 2: EP vs. LSC</th>
<th>Contrast 3: IL vs. LSC</th>
<th>Contrast 4: BOR vs. LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>4.4**</td>
</tr>
<tr>
<td>Marijuana</td>
<td>2.1*</td>
<td>0.8</td>
<td>1.0</td>
<td>3.6**</td>
</tr>
<tr>
<td>Cocaine</td>
<td>1.9</td>
<td>0.8</td>
<td>1.3</td>
<td>2.7**</td>
</tr>
<tr>
<td>Opiates</td>
<td>0.7</td>
<td>0.8</td>
<td>0.2</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Note: LSC = Low Symptom Control Group; EP = Emotional Pain Group; IL = Impulsive Lifestyle Group; BOR = Borderline Personality Group
* p < .05   ** p < .01
As can be seen in Table 8, pairwise comparisons comparing the high risk groups as a set to the low symptom control group showed minimal significant results. In fact, only severity of marijuana dependency remained significant after controlling for frequency of use.

Pairwise comparisons examining severity of dependency between the low symptom control group and each clinical group individually after controlling for frequency of use also revealed significant differences only vis-a-vis the borderline group with respect to alcohol, marijuana, and cocaine. There were no significant differences in dependence scores between the low symptom control group, the impulsive group, or the emotional pain group for any substances. These results suggest that the high rates of dependency observed in the impulsive and emotional pain groups was primarily a result of a higher frequency of use. However, given the same frequency of use, people high in borderline features are more susceptible to developing symptoms of dependence\(^3\).

\textit{Substance Dependence Controlling for Frequency of Use: Comparison Among High Risk Groups}

The fourth hypothesis was that inmates high in borderline features would have significantly greater substance dependence above and beyond what is accounted for by frequency of use when compared to inmates in the other high risk groups.

\(^3\) Analyses were also conducted with only those participants who reported using the substance in question once a month or more. Results showed the same pattern of significant results except the borderline group demonstrated significantly higher dependence on opiates when compared to the low symptom control group. To keep consistent with prior analyses, these results are not included.
A series of analyses of covariance were conducted to determine whether these differences in dependence held after controlling for frequency of substance use. For each of the ANCOVAs, the independent variable was clinical group. The dependent variables were severity of dependence on alcohol, marijuana, cocaine, or opiates. Participants’ frequency of use of the corresponding substance was used as a covariate. Pairwise comparisons were used to examine differences among high risk groups after controlling for frequency of use. Adjusted means and standard errors can be found in Table 7 and a summary of the pairwise contrast t-values can be found in Table 9.
Table 9. T-Values of Pairwise Comparisons Between High Risk Groups
Examining Severity of Dependence After Controlling for Frequency of Use

<table>
<thead>
<tr>
<th>Severity of Dependence</th>
<th>EP vs. IL</th>
<th>EP vs. BOR</th>
<th>IL vs. BOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>0.3</td>
<td>-3.0**</td>
<td>-3.5**</td>
</tr>
<tr>
<td>Marijuana</td>
<td>-0.1</td>
<td>-1.7</td>
<td>-1.6</td>
</tr>
<tr>
<td>Cocaine</td>
<td>-0.4</td>
<td>-1.2</td>
<td>-0.8</td>
</tr>
<tr>
<td>Opiates</td>
<td>0.9</td>
<td>0.1</td>
<td>-1.0</td>
</tr>
</tbody>
</table>

Note: EP = Emotional Pain Group; IL = Impulsive Lifestyle Group; BOR = Borderline Personality Group
* p < .05    ** p < .01
As can be seen in Table 9, the only dependence comparisons that remained significant after controlling for frequency of use were for alcohol between the borderline group and the other two high risk groups. These results suggest that people high in borderline features experience greater alcohol dependence than people who have other high risk personality characteristics even when consuming at the same frequency\(^4\).

*Alcohol Use Versus Drug Use*

The fifth hypothesis was that the emotional pain group would demonstrate significantly greater alcohol versus drug severity of dependence relative to the other high risk groups. The impulsive group would demonstrate significantly greater drug versus alcohol severity of dependence relative to the other high risk groups. Finally, the borderline group would demonstrate greater severity of dependency on both alcohol and drugs relative to the other high risk groups.

A mixed (between- and within-subjects) analysis of variance was conducted to assess whether the pattern of alcohol versus drug dependence differed between high risk groups. The three high risk groups was the between-subjects independent variable. The within subjects factor had two levels: severity of alcohol dependence and severity of drug dependence (“most severe drug dependence”). Contrary to hypotheses, there was no significant interaction between substance type dependence (alcohol versus drug) and

\(^4\) Analyses were also conducted with only those participants who reported using the substance in question once a month or more. Results showed the same pattern of significant results. To keep consistent with prior analyses, these results are not included.
group membership, Wilks’ Lambda = .99, $F (2, 222) = 1.62, p = .20$, partial eta squared = .01.

*Substance Use in the Year After Incarceration: High Risk Groups vs. Control Group*

Up to this point, the analyses have pertained to the substance use patterns of inmates during the year prior to their incarceration. Inmates were also followed up at one year post-release. Thus, the next set of analyses will pertain to the substance use patterns of inmates during the year after release. The sixth hypothesis was that each of the high risk groups would have significantly greater substance use problems in the year after incarceration than those in the low symptom control group.

A series of pairwise comparisons were conducted to explore the differences in substance use characteristics during the year after incarceration between the high risk groups and the low symptom control group. The substance use variables examined were as follows: the number of different types of substances used during the year after incarceration, substance use frequency (alcohol, marijuana, cocaine, opiates), and severity of substance dependence (alcohol, most severe drug, marijuana, cocaine, opiates). The pairwise comparisons were used to compare the low symptom control group to the three high risk groups as a set, as well as to each of the high risk groups individually. Means and standard deviations can be found in Table 10 and a summary of the pairwise contrast t-values can be found in Table 11.
<table>
<thead>
<tr>
<th></th>
<th>Low Symptom Control</th>
<th>Emotional Pain</th>
<th>Impulsive Lifestyle</th>
<th>Borderline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean (SD)</td>
<td>N</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Number of different types of substances Used</td>
<td>45</td>
<td>0.4 (0.8)</td>
<td>20</td>
<td>0.6 (0.8)</td>
</tr>
<tr>
<td>Substance Use Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>45</td>
<td>2.3 (2.2)</td>
<td>20</td>
<td>3.2 (2.6)</td>
</tr>
<tr>
<td>Marijuana</td>
<td>45</td>
<td>0.6 (1.6)</td>
<td>20</td>
<td>1.0 (2.2)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>45</td>
<td>0.4 (1.2)</td>
<td>20</td>
<td>1.4 (2.7)</td>
</tr>
<tr>
<td>Opiates</td>
<td>45</td>
<td>0.1 (0.6)</td>
<td>20</td>
<td>0.3 (1.1)</td>
</tr>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>45</td>
<td>0.3 (0.6)</td>
<td>20</td>
<td>0.6 (0.9)</td>
</tr>
<tr>
<td>Most Severe Drug Dep.</td>
<td>45</td>
<td>0.4 (0.9)</td>
<td>20</td>
<td>0.8 (1.2)</td>
</tr>
<tr>
<td>Marijuana</td>
<td>45</td>
<td>0.1 (0.4)</td>
<td>20</td>
<td>0.1 (0.4)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>45</td>
<td>0.3 (0.9)</td>
<td>20</td>
<td>0.6 (1.2)</td>
</tr>
<tr>
<td>Opiates</td>
<td>45</td>
<td>0.0 (0.2)</td>
<td>20</td>
<td>0.1 (0.7)</td>
</tr>
</tbody>
</table>
Table 11. T-Values of Pairwise Comparisons Examining Differences Between High Risk Groups and Low Symptom Control Group: Substance Use During the Year After Incarceration

<table>
<thead>
<tr>
<th></th>
<th>Contrast 1: All vs. LSC</th>
<th>Contrast 2: EP vs. LSC</th>
<th>Contrast 3: IL vs. LSC</th>
<th>Contrast 4: BOR vs. LSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of different types of substances Used</td>
<td>3.9**</td>
<td>0.8</td>
<td>2.5*</td>
<td>5.1**</td>
</tr>
<tr>
<td>Substance Use Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>1.5</td>
<td>1.2</td>
<td>0.4</td>
<td>2.2*</td>
</tr>
<tr>
<td>Marijuana</td>
<td>1.8</td>
<td>0.6</td>
<td>1.2</td>
<td>2.2*</td>
</tr>
<tr>
<td>Cocaine</td>
<td>3.6**</td>
<td>1.5</td>
<td>2.3*</td>
<td>4.3**</td>
</tr>
<tr>
<td>Opiates</td>
<td>2.6*</td>
<td>0.5</td>
<td>1.5</td>
<td>3.2**</td>
</tr>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>2.7**</td>
<td>1.6</td>
<td>0.5</td>
<td>3.8**</td>
</tr>
<tr>
<td>Most Severe Drug Dep.</td>
<td>3.3**</td>
<td>1.4</td>
<td>1.8</td>
<td>4.6**</td>
</tr>
<tr>
<td>Marijuana</td>
<td>0.9</td>
<td>0.0</td>
<td>0.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Cocaine</td>
<td>2.4*</td>
<td>1.0</td>
<td>1.3</td>
<td>3.3**</td>
</tr>
<tr>
<td>Opiates</td>
<td>2.8**</td>
<td>0.7</td>
<td>1.4</td>
<td>3.5**</td>
</tr>
</tbody>
</table>

Note: LSC = Low Symptom Control Group; All = All high risk groups; EP = Emotional Pain Group; IL = Impulsive Lifestyle Group; BOR = Borderline Personality Group
* p <.05  ** p <.01
As can be seen in Table 11, participants in the high risk groups as a set generally had used more different types of drugs in the year after incarceration, used substances more frequently, and reported greater severity of substance dependence, relative to the low symptom control group. It is important to note that those variables found to be non-significant nevertheless trended in the same direction. These results resemble findings regarding the substance use patterns of inmates during the year prior to incarceration.

Pairwise comparisons between the low symptom control group and each clinical group individually also revealed significant differences. Most strikingly, as compared to the low symptom control group, the borderline group used significantly more different types of drugs, used all substances more frequently, and demonstrated greater severity of dependence on alcohol, “any drug,” cocaine and opiates. This is similar the pattern of differences found in the year prior to incarceration. Also similar to the year prior to incarceration, the emotional pain group did not differ significantly on any variables from the low symptom control group. Finally, the impulsive group used significantly more different drugs and had higher cocaine use frequency than the low symptom control group.

Substance Use in the Year After Incarceration: Comparison Among High Risk Groups

The seventh hypothesis was that participants from the borderline group would have significantly greater substance use problems in the year after incarceration than either the emotional pain group or the impulsive lifestyle group. Also, participants in the
impulsive lifestyle group would have used significantly more different substances than participants in the emotional pain group.

To answer this question, series of pairwise comparisons were conducted to explore differences in the substance use characteristics during the year after incarceration between the high risk groups. The comparisons were run on the same dependent variables described in the previous analyses and were used to compare each of the high risk groups to one another. Means and standard deviations can be found in Table 10 and a summary of the pairwise contrast t-values can be found in Table 12.
Table 12. T-Values of Pairwise Comparisons Examining Differences Between High Risk Groups: Substance Use During the Year After Incarceration

<table>
<thead>
<tr>
<th></th>
<th>Contrast 1: EP vs. IL</th>
<th>Contrast 2: EP vs. BOR</th>
<th>Contrast 3: IL vs. BOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of different types of substances Used</td>
<td>-2.0</td>
<td>-3.7*</td>
<td>-0.1</td>
</tr>
<tr>
<td>Substance Use Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.7</td>
<td>-0.3</td>
<td>-1.2</td>
</tr>
<tr>
<td>Marijuana</td>
<td>-0.6</td>
<td>-0.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Cocaine</td>
<td>0.0</td>
<td>-0.8</td>
<td>-1.0</td>
</tr>
<tr>
<td>Opiates</td>
<td>-1.1</td>
<td>-2.0*</td>
<td>-0.2</td>
</tr>
<tr>
<td>Severity of Dependence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.8</td>
<td>-0.8</td>
<td>-1.0</td>
</tr>
<tr>
<td>Most Severe Drug Dep.</td>
<td>-0.3</td>
<td>-1.6</td>
<td>-1.3</td>
</tr>
<tr>
<td>Marijuana</td>
<td>-0.4</td>
<td>-1.5</td>
<td>-0.7</td>
</tr>
<tr>
<td>Cocaine</td>
<td>-0.1</td>
<td>-1.1</td>
<td>-1.0</td>
</tr>
<tr>
<td>Opiates</td>
<td>-0.8</td>
<td>-1.7</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

Note: EP = Emotional Pain Group; IL = Impulsive Lifestyle Group; BOR = Borderline Personality Group
* p < .05   ** p < .01
As can be seen in Table 12, while showing generally the same trend as substance use in the year prior to incarceration, very few of the comparisons were significant. Specifically, the borderline group used significantly more different substances and used opiates more frequently than the emotional pain group.
DISCUSSION

This study sought to examine the pre- and post-incarceration substance use patterns of three high risk personality types (i.e. emotional pain, impulsive lifestyle, and borderline personality features) chosen based on motivational models of substance use. It was hypothesized that the different personality types would exhibit different patterns and levels of substance use presumably because of their inclination to use substances to fulfill different needs. The analyses explained how the three high risk groups differed from a low symptom control group and how they differed from each other.

High risk groups as a whole compared to the low risk group.

As was expected, the three high risk groups together generally demonstrated elevated substance use and substance use problems as compared to the low risk group in both the year prior to and the year post incarceration. Specifically, inmates in the high risk groups together started using substances earlier, used a greater variety of substances, used substances more frequently, and demonstrated greater severity of substance dependence. While they trended in the same direction, the exceptions to this finding were that the three groups together did not differ significantly from the low risk group in the age at which they first began using cocaine and opiates, and, for the year after incarceration, in the frequency of alcohol and marijuana use and severity of dependence.
for marijuana. The general pattern of results support what has been previously found regarding high levels of substance use and substance use problems for people with high risk personality characteristics (Cooper, Frone, Russel, & Mudar, 1995; Trull et al., 2000; Simons, 2003).

The borderline group.

By far, the most prominent findings of this study pertained to the borderline group. In the year prior to incarceration, the borderline group demonstrated significantly greater problems with substance use as compared to the low risk group. Specifically, in the year prior to incarceration, inmates in the borderline group reported using substances at an earlier age, using a greater variety of substances, using substances at a higher frequency, and experiencing greater severity of substance dependence as compared to the low risk group. Despite trending in the same direction, the only exceptions to this pattern were that the borderline group did not differ significantly from the low risk group in the age at which they first began using cocaine and opiates. This finding supports what has been found in the literature thus far showing that borderline personality disorder is highly correlated with substance use (Feske et al., 2006; McGovern et al., 2006; C. A. Ross & Durkin, 2005; J. Ross et al., 2005; S. Ross et al., 2003; Skodol et al., 1999).

The borderline group also demonstrated significantly greater substance use than the other two high risk groups. More specifically, we found that, as compared to people in the emotional pain group, people in the borderline group used drugs more frequently and were more dependent on both alcohol and drugs. Also, compared to people in the
emotional pain group, people in the borderline group began using drugs at an earlier age and used a greater variety of drugs. People in the borderline group differed from people with high impulsivity in that they demonstrated a greater severity of dependence on alcohol. These findings suggest that, indeed, certain high risk characteristics (specifically, borderline features) are associated with greater substance use and substance use problems than other high risk characteristics.

Given the degree of differences in substance use patterns among the three high risk groups, it would appear that something about borderline personality features as opposed to other high risk factors makes one either less able or less willing to abstain from substance use. As discussed earlier, the main facets of borderline personality disorder are impulsivity and emotional instability (Trull et al., 2000). As such, a possible explanation for these findings is that the combination of these two high risk characteristics puts one at greater risk for increased use. Specifically, it could be that the tendency to experience intense emotional pain combined with an impulsive urge to lessen or “self-medicate” the pain is the root of the observed higher rates of substance use among people with borderline features. Such a pathway to the observed elevated substance use patterns among people diagnosed with borderline personality disorder has been suggested by other researchers as well (Bornavalova et al., 2005; Chabrol et al., 2005; Grilo et al., 1997).

Notably, the borderline group appeared to have greater problems with substance use than the other high risk groups even when the consequences were potentially more serious. Unlike the other two high risk groups, the borderline group also demonstrated
elevated substance use of all kinds *in the year after* incarceration when compared to the low risk group. This is an important finding given that maintaining sobriety during this period is especially imperative as it is usually a condition for probation. Thus, substance use puts one a greater risk for re-incarceration. As compared to the low risk group, the borderline group reported using more different types of drugs, using substances more frequently, and a greater severity of substance dependence. The only exception was that there were no significant differences in severity of marijuana dependence between the borderline group and the low risk group. As for the other two high risk groups during the year after incarceration, the impulsive group differed from the low risk group only with respect to number of different drugs used and the frequency of cocaine use; the emotional pain group did not differ from the low risk group on any substance use variable. Again, it is possible that the interaction of the two main facets of borderline personality disorder, impulsivity and emotional instability (Trull et al., 2000), make it more difficult for one to abstain from substance use putting him or her at greater risk for relapse then having one of the characteristics alone.

In addition to degree, the results of this study also suggest that there is a qualitative difference in the substance use of the borderline group as compared to the other two high risk groups. Unlike the inmates in the other two high risk groups, when compared to a low symptom control group, those in the borderline group continue to demonstrate significantly greater severity of dependence with respect to alcohol, marijuana, and cocaine even after controlling for frequency of use. Also, when compared to people in the other two high risk groups and controlling for frequency of use, people in
the borderline personality features group continue to demonstrate significantly greater alcohol dependence.

Previous research has shown that some populations are more vulnerable to developing substance dependency than others given the same frequency of use (Cooper, 1995; Simons, 2005; Simons, Carey & Gaher, 2004). These authors suggest that these individuals may have a tendency to use drugs and alcohol to function and cope with life stressors. Specifically, this tendency could be a reflection of poor problem solving skills and thus, the substance abuse problems (a major feature of dependence) experienced by people high in borderline features may be exacerbated by their inability to deal with them effectively. For example, take the situation of a person who wakes up for work with a hangover after a long night of substance abuse. Someone who is high in emotional pain (without impulsivity) may decide to get up and go to work despite feeling anxious or sad. Someone high in impulsivity (but low on emotional pain) may also decide to go to work as they are not feeling excessively sad or anxious. However, someone who is high in borderline features who is experiencing both emotional pain and impulsivity may decide instead that he/she is too sad/anxious to go to work and therefore impulsively choose to stay home leading him/her to be fired from his/her job. As a result, despite using a substance just as frequently, the person with high borderline features would exhibit poorer problem solving skills leading to greater severity of dependence relative to people with other high risk characteristics.

Another possible explanation for these findings could be differences in the amounts of substances used across the groups. For example while the frequency of
cocaine use might be similar among groups (e.g. 1-3 times per month), it is possible that people with borderline features tend to use significantly greater amounts of cocaine within a given drug use session (i.e., moderate use versus “binging”). This study did not include a detailed assessment of quantity and qualitative aspects of substance use. Such information would require a detailed timeline followback procedure and should be a direction for future research. It is also possible that people with borderline features are more likely to engage in more harmful or riskier methods of substance use (e.g., injecting opiates intravenously versus snorting) which may lead to a greater severity of dependence.

The borderline group did not differ from the other high risk groups with respect to pattern of severity of dependence on alcohol versus drugs (i.e., does one clinical group have greater severity of dependency on alcohol versus drugs and another group have greater severity of dependency on drugs versus alcohol). Specifically, it was predicted that, as compared to the other high risk groups, the emotional pain group would be vulnerable to more severe alcohol dependence versus drug dependence due to alcohol’s “self-medicating” effects. Also, compared to the other high risk groups, the impulsive group would be more vulnerable to more severe drug dependence versus alcohol dependence as their impulsivity may overcome any legal or stigma that might otherwise inhibit use. Finally, compared to the other high risk groups, the borderline group would demonstrate equally high severity of dependence on both alcohol and drugs. Contrary to the hypotheses however, results indicate that there are no differences between groups with respect to the pattern of severity of dependency on alcohol vs. drugs. In fact, while
differing in degrees of severity of dependence, all three groups showed the same pattern of greater drug versus alcohol severity of dependence. One potential explanation for the null findings could be related to the population. Specifically, unlike for alcohol, drug use and possession are illegal, therefore incarcerated populations will naturally have higher rates of people with drug related problems compared to non-incarcerated populations. As such, differences in alcohol versus drug severity of dependence between high risk groups may prove to be significant in non-incarcerated populations.

*Impulsive group.*

The impulsive group also demonstrated elevated substance use patterns compared to the low symptom control group although not to the degree of the borderline group. Similar to the borderline group, the impulsive group demonstrated earlier ages of substance use onset and used a greater variety of substances as compared to the low risk group. Notably, however, while the impulsive group also demonstrated greater drug (marijuana and cocaine) use frequency and greater severity of drug (most severe drug, marijuana and cocaine) dependency during the year prior to incarceration, the impulsive group did not differ significantly from the low risk group with respect to alcohol use frequency and severity of alcohol dependence during the year prior to incarceration. This finding is something that has not, as of yet, been discussed in the literature. Unfortunately, there exist few studies that examine both alcohol and drug use, and none that examine the differences in alcohol and drug use among high risk personality types.
Similarly, in comparing the impulsive group to emotional pain group, the impulsive group generally demonstrates greater problems with drug use, but not alcohol use. Specifically, as compared to the emotional pain group, the impulsive group began using drugs at an earlier age, used a greater variety of drugs, used cocaine more frequently, and were more severely dependent on drugs. There were no significant differences between the two groups with respect to age of first alcohol use, alcohol use frequency, and severity of alcohol dependence.

One explanation for higher drug but not alcohol use in the impulsive group could be that people who are impulsive have a decreased ability to consider the implications of their actions (Colder & Chassin, 1997). As such, people who are highly impulsive may engage in greater frequency of drug use as compared to someone who is less impulsive because they are less likely to consider the legal and social consequences of using an illegal substance (e.g. arrest, stigma, criticism of friends and family, etc.). As a result, this increased frequency of use would also lead to a greater severity of dependence on drugs as compared to people in the low risk group and emotional pain group (both of which had low impulsivity as a part of the criteria for group membership). As alcohol use is both legally and more socially acceptable than drug use, there are fewer harmful consequences that may prevent someone who is low in impulsivity from using.

*Emotional pain group.*

Most surprisingly, inmates in the emotional pain group did not differ significantly with respect to substance use as compared to the low risk group, either in the year prior to
or the year after incarceration (the lone exception to this finding was that inmates in the emotional pain group reported using alcohol at a significantly earlier age). These findings stand in sharp contrast to the vast majority of research showing that anxiety and depression are substantially correlated with drug and alcohol use (Cooper, Frone, Russel, & Mudar, 1995).

One possible explanation for this finding could be that impulsivity moderates the relationship between anxiety/depression and substance use such that people who are highly anxious/depressed are only more prone to substance abuse depending on their level of impulsivity. As described earlier, the emotional pain group was composed of inmates who reported high levels of anxiety and/or depression and not high levels of impulsivity. As such, it is possible that the emotional pain group did not differ from the low symptom control group as a result of low impulsivity. The majority of prior research reporting a link between anxiety/depression and substance abuse did not evaluate the extent to which co-occurring impulsivity might account for their findings.

Only a handful of studies have examined the moderating role of impulsivity. In a study of 592 college undergraduates conducted by Simmons, Carey and Gaher (2004), impulsivity was found to moderate the relationship between affective lability and alcohol use problems such that those who were affectively labile and highly impulsive experienced more alcohol related problems than those who were affectively labile and less impulsive. Additionally, a study conducted by Hussong and Chassin (1994) found that impulsivity moderated the relationship between depression and alcohol use such that those who were depressed and highly impulsive drank more heavily than those who were
depressed and less impulsive. Unlike these studies, our study did not statistically
evaluate the moderating role of impulsivity; however, based upon results from other
analyses, it does appear that this may be the case and thus is an area for further study.

Another possible explanation for this finding is that the sample used in this study
– a correctional sample – is already higher in anxiety and depression (Teplin, 1994) and
more likely to use drugs and alcohol (BJS, 1994; Brecht et al., 2003) than non-criminal
populations. Therefore, there are not many truly “low risk” inmates in the control group
used in this study. However, an examination of the PAI scores for the indices used to
create the groups (anxiety, anxiety related disorders, depression, borderline) reveals that
the low risk group actually scores in the 50th percentile or lower (normed on a non-
clinical population). As such, there does not appear to be much of a difference between
the low risk group and a non-jail population with respect to anxiety/depression symptoms
or borderline features. Nevertheless, the control group used in this study most likely
differs from a true, non-jail population control group in other ways. By virtue of the fact
that those in jail have committed crimes, it is likely that all participants in this sample
differ from a non-jail population at least in some degree with respect to poor problem
solving skills and bad judgment, two characteristics that influence substance use patterns.
As such, the control group in this study is naturally more likely to have increased
substance use habits and thus may not differ as greatly from the high risk groups.

The negligible difference between the “emotional pain” (high anxiety and/or high
depression) group and the low risk group could also be related to the timing of
assessments used to create these high risk and control groups. PAI assessments
administered within two weeks of entering the jail were used to create these groups. Thus, a high anxiety or depression score may actually be more of a reflection of an inmate’s emotional state regarding his or her recent incarceration, rather than reflecting a stable trait. If this were the case, the assessment of level of anxiety or depression would not necessarily be reflective of anxiety and depression prior to incarceration hypothesized to have an impact on pre-incarceration substance use patterns.

One way to assess whether the stability of the high risk characteristics influenced our findings would be to look at the stability of the PAI variables used in this study. Data from the current study indicate that PAI depression and anxiety are only slightly less stable than PAI borderline features when considering the correlations between assessments performed at intake and then again at one year post-release. Specifically, the correlations over time for depression and anxiety were $r = 0.55, p < .01$ and $r = 0.62, p < .01$ respectively. The correlation over time for borderline was $r = 0.65, p < .01$. These correlations suggest that the variables used to create the high risk groups are relatively stable over time and, importantly, not different from one another.

More generally, Axis I disorders (such as anxiety and depression) are less stable and are more prone to wax and wane in severity as compared to Axis II disorders (such as borderline personality disorder). If this were the case, fluctuating levels of anxiety and depression may lead to fluctuating severity of substance use and thus perceivably less

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5 As the level of impulsivity was derived from the PCL-R a measure that evaluates the participant’s impulsive behaviors over his/her lifetime, this is considered a stable trait and fluctuations could not be evaluated between time periods.

6 Questions pertaining to anxiety related disorders were not asked at one year post-release and therefore stability correlations could not be derived.
severe substance use if averaged over a long period of time (as was the case in this study which assessed substance use during the year prior to and the year after incarceration). Research comparing the stability of Axis I disorders such as anxiety and depression and Axis II disorders such as borderline personality disorder have had mixed findings. A recent study conducted by Shea and Yen (2003) reviewed three naturalistic studies of personality disorders, anxiety disorders, and depression over a two year time frame. Only 42% of those diagnosed with borderline personality disorder had gone into remission as compared to 81% of those diagnosed with major depression. Those diagnosed with some form of anxiety disorder had remission rates that ranged between 15% and 60%. These results suggest that a diagnosis of borderline personality disorder is significantly more stable than that of major depression, but possibly more similar to an anxiety disorder, in terms of stability. The authors point out, however, that people with major depression have high rates of relapse suggesting that it is more of a stable disorder than these remission rates would suggest (Shea & Yen, 2003). In sum, the stability of the different traits that compose the high risk groups may have influenced the observed discrepancies in substance use patterns.

_Treatment Implications_

The results of this study have many implications for substance abuse treatment of people with high risk personalities. As described earlier, substance use is significantly correlated with criminal behavior (Bureau of Justice Statistics, 1994) and thus identifying at-risk populations for treatment during the period of incarceration could be an important
step toward reducing recidivism. Further, effective treatment of these populations would greatly reduce the costs related to untreated substance abuse problems such as health issues, loss of productivity, family dysfunction and HIV risk.

Results of this study suggest that people with impulsivity or borderline features are significantly more likely to enter jail with substance use problems than other inmates. It is clear that both types of people would benefit from substance abuse treatment and education. As such it would be highly beneficial to administer brief self report measures (such as the borderline features scale on the PAI) to screen inmates for these characteristics upon intake. This way, at risk inmates could be directed to jail substance use counseling services that are specifically designed to address the characteristics associated with increased substance use. Specifically, elements from Cognitive Behavioral Therapy (Beck, Wright, Newman, & Liese, 1993), Dialectical Behavioral Therapy (Linehan et al., 1999), or Acceptance and Commitment Therapy (Hayes & Strosahl, 2005) have been shown to be especially helpful for teaching the people how to deal more effectively with negative emotion and resist impulsive urges.

The results also suggest that people high in borderline features are more prone to developing symptoms of dependence than other groups. This point is important in a number of ways. First of all, people with borderline personality features are more likely to enter jail exhibiting symptoms of withdrawal. Withdrawal symptoms can range in severity from sweating and tachycardia to grand mal seizures and psychosis (APA, 2000). As such, it is important for jail officials to identify those high in borderline features as they will more likely to be in need of services to help them manage these symptoms
safely and humanely during the initial period of incarceration. Second, people reporting more problems with dependence are also by definition more likely to have problems in their relationships with friends and family (APA, 2000) and thus are likely to have less social support outside of jail. This is especially important to consider in that research has shown that communication with friends and family during incarcerations significantly reduces rates of recidivism (Bales & Mears, 2008). By identifying inmates at risk early in the period of incarceration, steps can be taken to enroll them in programs designed to help them reconnect with those whom they have hurt as a result of their dependencies. Third, people who are more susceptible to dependence are apt to have more difficulty remaining substance-free once released from jail. As such, people high in borderline features would likely benefit from relapse prevention programs designed to help them maintain their sobriety once they return to the community. Given the importance of seamless treatment transition and continuity of care, programs could also help inmates to connect with local substance abuse counseling outside of jail.

Limitations

One significant limitation of this study is the reliance upon self-report measures of substance use. It would be beneficial in future studies to obtain information about substance use in ways other than self-report such as urine test screening or hair assay to get a more accurate measure of substance use. A meta-analytic review of 24 studies on high risk populations suggests that people tend to significantly underreport substance use when compared to urinalysis or hair assay (Magura & Kang, 1996). Similar results have
been found when examining the validity of self-report substance use with respect to
criminal populations (Farabee & Frelund, 1996; Fendrich & Xu, 1994; Lu, Taylor, &
Riley, 2001). Nevertheless, every effort was made to enhance the validity and reliability
of our self-report data. The interviewers who administered the measures were thoroughly
trained in data collection methods that best increased the validity of the data gathered.
Additionally, as discussed earlier, our study obtained a certificate of confidentiality
which assured participants that their data would not be released to anyone, especially jail
officials. We can be somewhat confident that the participants were comfortable sharing
their substance use habits as they freely acknowledged high rates of other illegal
activities.

Another limitation of the current study is that the results are not necessarily
generalizable to non-corporation settings. While these results provide some guidance for
helpful ways to conceptualize and treat the substance use problems of inmates, the same
patterns of use may not exist outside of jail populations. As such, further research needs
to be conducted on community samples before conclusions can be made with confidence
about links between clinical problem groups and substance use in the general population.

**Future Directions**

This study identified jail inmates who are at high risk for substance use and
dependence, and explored how those with three distinct high risk personality profiles
differed in their patterns of substance use, thus providing a rational for more focused
treatment plans. More research needs to be completed examining the moderating role of
impulsivity on anxiety/depression and substance abuse. As the results of this study suggest, impulsivity appears to be an important factor in evaluating the risk for substance abuse in populations with high anxiety and/or depression. This would also provide rationale for studying more thoroughly how to help people overcome their impulsiveness that leads to dangerous substance abuse.

In conclusion, this study has demonstrated the important link between high risk characteristics, most notably impulsivity and borderline features, and increased substance use. Currently, there is approximately 2.2 million people incarcerated in this country, 50 to 75 percent of whom are abusing drugs and alcohol (Conklin et al., 2003). The period of incarceration is an ideal time to intervene with this population as they are in desperate need of services to help them overcome their substance use problems, a major factor contributing to their criminality. Given limited resources, a more pointed approach to the substance abuse treatment of jail populations may be more beneficial. Specifically, the results of this study suggest that the assessment of inmates for higher levels of impulsivity and borderline features would allow officials to identify those inmates who are most likely to have more serious substance abuse problems. This segment can then be offered substance abuse treatment designed to address those personality features that are putting them at greater risk. With a more targeted and thus more effective and efficient approach to substance abuse treatment in our jails and prisons, we stand to not only improve the quality of life for those individuals, but for society as a whole as well.
APPENDIX A

Items from the Personality Assessment Inventory (PAI)

**Anxiety**
I often have trouble concentrating because I'm nervous  
It's often hard for me to enjoy myself because I am worrying about things.  
I'm often so worried and nervous that I can barely stand it  
My friends say I worry too much  
I don't worry about things any more than most people  
I don't worry about things that I can't control  
I usually worry about things more than I should  
Sometimes I get so nervous that I'm afraid I'm going to die  
I am so tense in certain situations that I have great difficulty getting by  
I can't do some things well because of nervousness.  
Sometimes I am afraid for no reason.  
I'm not the kind of person who panics easily  
I am a very calm and relaxed person  
I often feel as if something terrible is about to happen.  
I seldom feel anxious or tense  
I am easily startled  
I often feel jittery  
I worry so much that at times I feel like I am going to faint  
Sometimes I feel dizzy when I've been under a lot of pressure  
I can often feel my heart pounding  
It's easy for me to relax  
When I'm under a lot of pressure, I sometimes have trouble breathing  
I get sweaty hands often  
I have very steady hands

**Anxiety Related Disorders**
I have to do some things a certain way or I get nervous  
I have impulses that I fight to keep under control.  
It bothers me when things are out of place  
I can relax even if my home is a mess.  
People say that I'm a perfectionist  
I'm usually aware of objects that have a lot of germs  
People see me as a person who pays a lot of attention to detail.  
I keep myself under tight control.  
I often fear I might slip up and say something wrong.  
I have exaggerated fears
I get very nervous when I have to do something in front of others
I'm not easily frightened
I don't mind driving on freeways
I don't mind heights
I will not ride in airplanes
I don't mind traveling in a bus or train
I keep reliving something horrible that happened to me
Thoughts about my past often bother me while I'm thinking about something else
I've been troubled by memories of a bad experience for a long time.
I can't seem to get over something from my past
I have had some horrible experiences that make me feel guilty
I keep having nightmares about my past
Since I had a very bad experience, I am no longer interested in some things that I used to enjoy.
I avoid certain things that bring back bad memories

**Borderline Features**
My mood can shift quite suddenly
My moods get quite intense
My mood is very steady
I have little control over my anger
I've always been a pretty happy person
I've had times when I was so mad I couldn't do enough to express all my anger.
My attitude about myself changes a lot.
Sometimes I feel terribly empty inside.
I worry a lot about other people leaving me.
I often wonder what I should do with my life
I can't handle separation from those close to me very well.
I don't get bored very easily
My relationships have been stormy
I want to let certain people know how much they've hurt me
People once close to me have let me down.
I rarely feel very lonely
I've made some real mistakes in the people I've picked as friends
Once someone is my friend, we stay friends
I sometimes do things so impulsively that I get into trouble
When I'm upset, I typically do something to hurt myself.
I'm too impulsive for my own good
I spend money too easily
I'm a reckless person.
I'm careful about how I spend my money.
Depression
I feel that I've let everyone down
Sometimes I think I'm worthless
I don't feel like trying anymore
I can't seem to concentrate very well
No matter what I do, nothing works.
I think good things will happen to me in the future.
I have something worthwhile to contribute
I'm pretty successful at what I do
Much of the time I'm sad for no real reason
I've forgotten what it's like to feel happy
Everything seems like a big effort
Nothing seems to give me much pleasure
I've lost interest in things I used to enjoy
I have no interest in life.
Lately I've been happy much of the time
I'm almost always a happy and positive person
I hardly have any energy
I have no trouble falling asleep
I rarely have trouble sleeping
I've been moving more slowly than usual
I often wake up very early in the morning and can't get back to sleep
I have a good appetite.
I often wake up in the middle of the night
I have little interest in sex
APPENDIX B

Items from the Texas Christian University - Correctional Residential Treatment Form, Initial Assessment (TCU-CRTF)

Age of First Use:
How old were you when you first started drinking alcohol?
How old were you when you first used marijuana or hash?
How old were you when you first used cocaine, crack, or freebase?
How old were you when you first used opiates (like heroin, morphine, street methadone, oxycontin, percocet, dilaudid, demerol without a prescription, etc.)?

Number of Different Drugs Used in the Past Year and Frequency of Use:
About how often did you drink alcohol during the 12 months prior to your incarceration?
About how often did you use marijuana or hash during the 12 months prior to your incarceration?
About how often did you use opiates during the 12 months prior to your incarceration?
About how often did you use cocaine, crack or freebase during the 12 months prior to your incarceration?
About how often did you use speedballs during the 12 months prior to your incarceration? (Number of Different Drugs Only)
About how often did you use inhalants during the 12 months prior to your incarceration? (Number of Different Drugs Only)
About how often did you use amphetamines during the 12 months prior to your incarceration? (Number of Different Drugs Only)
About how often did you use hallucinogens during the 12 months prior to your incarceration? (Number of Different Drugs Only)
About how often did you use ecstasy during the 12 months prior to your incarceration? (Number of Different Drugs Only)
About how often did you use sedatives and tranquilizers during the 12 months prior to your incarceration? (Number of Different Drugs Only)

0 = Never
1 = Less than once a month
2 = 1 time per month
3 = 1 to 3 times per month
4 = 1 to 2 times per week
5 = 3 to 4 times a week
6 = 5 to 6 times a week
7 = Daily
8 = More than once a day
Severity of Substance Dependence:

Alcohol Questions

Tolerance:
How often did you find that your usual number of drinks had much less effect on you or that you had to drink more in order to get the effect you wanted?

Withdrawal:
During the 12 months prior to your incarceration, when the effects of alcohol were wearing off, how often did you -

- Have trouble falling asleep or staying asleep?
- Find yourself shaking?
- Feel depressed, irritable, or nervous?
- Feel sick to your stomach or vomit?
- Have a very bad headache?
- Find yourself sweating or feel like your heart was racing?
- See, feel or hear things that were not really there?
- Have fits or seizures?
- Take a drink or a drug to help you get over a hangover or to help you feel better?

Substance taken in larger amounts or over longer period than intended:
How often did you start drinking even though you had decided not to?
How often did you drink more or for a much longer period of time than you had intended?

Persistent desire or unsuccessful efforts to cut down or control substance use:
How often did you want to – or try to – stop or cut down on your drinking but found you could not?

Great deal of time is spent in activities necessary to obtain the substance or recover from its effects:
How often did you spend so much time drinking or being sick from drinking that you had little time left for important things like work, school, family, or friends?

Important activities are given up or reduced because of substance use:
How often did you give up or cut down on things that are important to you like work, school, hobbies, or time with your family in order to drink?

Continued use despite knowledge of having a persistent physical or psychological problem that is likely to have been caused or exacerbated by the substance:
How often did you continue to drink even though you knew it was making you feel either depressed, or uninterested in life, or suspicious and distrustful of other people?
How often did you continue drinking even though you knew drinking was causing you a health problem or making a known health problem worse?

0 = Never
1 = 1 time only
Marijuana
Tolerance:
How often did you find that your usual amount of marijuana or hash had much less effect on you or that you had to use more in order to get the effect you wanted?

Substance taken in larger amounts or over longer period than intended:
How often did you start using marijuana or hash even though you had decided not to or promised yourself that you would not use it?
How often did you use marijuana or hash for a much longer period of time than you had intended to?

Persistent desire or unsuccessful efforts to cut down or control substance use:
How often did you want to -- or try to -- stop or cut down on your marijuana or hash use but found you could not?

Great deal of time is spent in activities necessary to obtain the substance or recover from its effects:
How often did you spend so much time using, scoring, or being hung-over from marijuana or hash that you had little time left for important things like work, school, family, or friends?

Important activities are given up or reduced because of substance use:
How often did you give up or cut down on things that are important to you like work, school, hobbies, or time with your family in order to use or score marijuana or hash?

Continued use despite knowledge of having a persistent physical or psychological problem that is likely to have been caused or exacerbated by the substance:
How often did you continue to use marijuana or hash even though you knew it was making you feel either depressed, or uninterested in life, or suspicious and distrustful of other people?
How often did you continue to use marijuana or hash even though you knew it was causing you a health problem or making a known health problem worse?

0 = Never
1 = 1 time only
2 = 2 to 3 times
3 = 4 to 6 times
4 = 7 or more times

Cocaine
Tolerance:
How often did you find that your usual amount of cocaine had much less effect on you or that you had to use more in order to get the effect you wanted?

**Withdrawal:**
During the 12 months prior to your incarceration, when the effects of cocaine were wearing off, how often did you:
- Feel extremely tired?
- Have vivid or unpleasant dreams?
- Sleep more than usual or have trouble falling asleep or staying asleep?
- Have a greatly increased or decreased appetite?
- Feel agitated or extremely anxious?
- How often did you use cocaine or other drugs to help you feel better when coming down from cocaine?

**Substance taken in larger amounts or over longer period than intended:**
- How often did you start using cocaine even though you had decided not to or promised yourself that you would not use it?
- How often did you use cocaine for a much longer period of time than you had intended to?

**Persistent desire or unsuccessful efforts to cut down or control substance use:**
- How often did you want to -- or try to -- stop or cut down on your cocaine use but found you could not?

**Great deal of time is spent in activities necessary to obtain the substance or recover from its effects:**
- How often did you spend so much time using cocaine, scoring cocaine, or being hung-over from cocaine that you had little time left for important things like work, school, family, or friends?

**Important activities are given up or reduced because of substance use:**
- How often did you give up or cut down on things that are important to you like work, school, hobbies, or time with your family in order to use cocaine or score cocaine?

**Continued use despite knowledge of having a persistent physical or psychological problem that is likely to have been caused or exacerbated by the substance:**
- How often did you continue to use cocaine even though you knew it was making you feel either depressed, or uninterested in life, or suspicious and distrustful of other people?
- How often did you continue to use cocaine even though you knew cocaine was causing you a health problem or making a known health problem worse?

0 = Never  
1 = 1 time only  
2 = 2 to 3 times  
3 = 4 to 6 times  
4 = 7 or more times
Opiates

**Tolerance:**
How often did you find that your usual amount of opiates had much less effect on you or that you had to use more in order to get the effect you wanted?

**Withdrawal:**
During the 12 months prior to your incarceration, when the effects of opiates were wearing off, how often did you -
- Have trouble falling asleep or staying asleep?
- Find your eyes were red or tearing?
- Feel depressed, irritable, or nervous?
- Feel sick to your stomach or vomit?
- Have muscle aches?
- Find yourself sweating or having goose flesh?
- Feel hot as if you were running a fever?
- Have diarrhea?
- Finding yourself yawning often?

How often did you use opiates or other drugs to help you feel better when coming down from opiates?

**Substance taken in larger amounts or over longer period than intended:**
How often did you start using opiates even though you had decided not to or promised yourself that you would not use it?
How often did you use opiates for a much longer period of time than you had intended to?

**Persistent desire or unsuccessful efforts to cut down or control substance use:**
How often did you want to -- or try to -- stop or cut down on your opiate use but found you could not?

**Great deal of time is spent in activities necessary to obtain the substance or recover from its effects:**
How often did you spend so much time using opiates, scoring opiates, or being hung-over from opiates that you had little time left for important things like work, school, family, or friends?

**Important activities are given up or reduced because of substance use:**
How often did you give up or cut down on things that are important to you like work, school, hobbies, or time with your family in order to use opiates or score opiates?

**Continued use despite knowledge of having a persistent physical or psychological problem that is likely to have been caused or exacerbated by the substance:**
How often did you continue to use opiates even though you knew it was making you feel either depressed, or uninterested in life, or suspicious and distrustful of other people?

How often did you continue to use opiates even though you knew it was making you feel either depressed, or uninterested in life, or suspicious and distrustful of other people?
0 = Never
1 = 1 time only
2 = 2 to 3 times
3 = 4 to 6 times
4 = 7 or more times
REFERENCES


CURRICULUM VITAE

Peter Forkner was raised in Milton, Massachusetts. He attended Vanderbilt University in Nashville, Tennessee where he obtained his undergraduate degree in psychology. Upon the completion of his degree, Peter moved to Boston where he worked as a research assistant at Massachusetts General Hospital for 3 years in Pediatric Psychopharmacology. In 2003, Peter was accepted into George Mason University’s Clinical Psychology Doctoral Program. While in the program, Peter provided counseling services at the George Mason University Psychological Clinic, the George Mason University Counseling Center, and Catholic University’s Counseling Center. In May of 2008, Peter completed his pre-doctoral internship at the University of New Hampshire’s Counseling center. He received his Master of Arts in Clinical Psychology from George Mason University in May 2006 and will be awarded his Ph.D. in Clinical Psychology from George Mason University in August 2009. Following the completion of his degree, Peter will start a post-doctoral position as a counselor at Salem State College in Salem, Massachusetts.