ABSTRACT

Title of Dissertation:	IMPACT OF RESIDENTIAL SUBSTANCE ABUSE TREATMENT ON AFFECT- AND PERSONALITY-RELATED VARIABLES ACROSS INNER-CITY SUBSTANCE ABUSERS
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Substance abuse treatment outcome studies have shown positive effects for a large number of drug users with regard to reduction in substance use and criminal activity, as well as improvement of general well-being. However, high rates of relapse following treatment have compelled researchers to elucidate the individual difference factors that change among those who receive substance abuse treatment. Affect- (depressive and anxiety symptoms) and disinhibition–related variables (impulsivity, risk taking) may be of particular relevance. These factors are related to the development and maintenance of substance use and distinguish between substance users with and without Axis I and II disorders that may interfere with treatment success, such as depression, anxiety disorders, or antisocial personality disorder. Consequently, these factors may be considered important treatment targets. However, there currently is a dearth of research focused on understanding whether these variables are affected by standard substance use treatments, and more specifically, which variables may change throughout the course of substance use treatment. Given that many of these variables are considered to be enduring aspects

of an individual's personality, the extent to which they are malleable by treatment is an important consideration. Moreover, to enhance the generalizability of these findings, it is important to understand the extent to which changes occur in more standard substance use treatments as opposed to more elaborate and targeted treatments that rarely are disseminated in real world treatment settings. Therefore, the purpose of the current study was to examine the effect of a residential substance use treatment program on particular affect- (e.g., depressive and anxiety symptoms, stress reactivity) and disinhibition-related variables (e.g., risk taking). A sample of 81 inner-city substance abusers were assessed on self-reported and behavioral measures of the above affect- and disinhibition-related variables that have previously found to be implicated in substance use over a 30-day course of treatment. A residential treatment program provides an optimal setting for evaluating changes as behavioral confounds (i.e., substance use) can be controlled, and the natural changes during abstinence can be measured with both reliability and validity. A significant pre-post treatment decrease was found on scores of risk taking, as indexed by the Balloon Analogue Risk Task (BART); levels of depressive symptomatology and stress reactivity also evidenced a significant pre-post decrease. These data are discussed with respect to implications for understanding the factors that underlie mechanisms of change during treatment, thereby informing substance abuse prevention and treatment programs.

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AFFECT- AND PERSONALITY-RELATED VARIABLES ACROSS
INNER-CITY SUBSTANCE ABUSERS

By

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Chapter 1: Theoretical Rationale

Introduction

Substance use (e.g., drug, alcohol), dependence, and addiction are significant

public health concerns. In 2003, 7.1% of Americans aged 12 or older were classified as

current substance abusers. Statistically significant increases in the use of heroin,

marijuana, cocaine, and pain relievers were reported from 2000 to 2001 (Substance

Abuse and Mental Health Services Administration [SAMHSA], 2002). Furthermore, 17%

of Americans reported lifetime substance abuse or dependence at some point. The highest

prevalence rates of substance abuse have been reported (upwards of 90%) within inner-

city settings. One reason for this may be that inner-city individuals are likely to be

exposed to substances more frequently than other subpopulations (Wallace, 2001).

The consequences of this high prevalence of substance abuse represent an

enormous cost to society. An estimated $484 billion is lost each year due to substance

abuse-related costs, including crime, reduced job production, lost wages, health care

expenditures, prevention, and treatment efforts (National Institute on Drug Abuse

[NIDA], 2004). Furthermore, over $60 billion is spent on drugs annually, with $10 billion

being spent on heroin, $35.2 billion on cocaine, $10.5 billion on marijuana, $15 billion

on prescription drugs, and $5 billion on other illegal drugs (SAMHSA, 2002).

Of current substance abusers in the United States, only 1.4% of them have sought

some form of treatment for their drug or alcohol use. In particular, 1.2 million substance

abusers receive treatment at an outpatient treatment facility, 752,000 at a

residential/inpatient treatment facility, 729,000 at an outpatient mental health center,

587,000 at a hospital as an inpatient, 377,000 at a private doctor's office, 251,000 at an

emergency room, and 206,000 in prison or jail (SAMHSA, 2002). While treatment of substance abuse generally facilitates the recovery process compared to minimal or no treatment, a considerable number of addicted individuals relapse soon after treatment. Specifically, relapse rates during the year following treatment may be as high as 70% to 80% (Ravndal & Vaglum, 2002; Simpson, Joe, & Brown, 1999, United States Department of Health and Human Services [USDHHS], 2005).

In general, substance abuse treatment outcome studies have shown positive effects for a large number of substance users with regard to reduction in substance use, criminal activity, and improvement of psychological well-being (e.g., Guydish et al., 1999; Hubbard et al., 1997). However, the high rates of relapse have compelled researchers to elucidate the factors that account for treatment success and failure, especially in regard to individual difference variables. Affect- and personality-related variables have been identified as focal targets of treatment, as they are considered to be associated with substance abuse. Studies have examined these variables as predictors of treatment outcome within methadone maintenance, outpatient, and residential substance abuse treatment programs (See Appendix A for additional detail regarding various settings for substance abuse treatment). However, the extent to which affect- and personality-related variables *change* during the course of treatment remains less well understood. The remaining sections of the introduction will outline the theoretical and clinical relevance of these predictors to substance abuse, followed by a review of studies that examine these variables as outcomes of treatment and the degree to which they change over time. Affect-related variables will be covered first, followed by personality variables.

Affect-Related Variables on Substance Abuse and Treatment Outcome

Current work on substance abuse populations generally recognizes that affect-related variables, such as negative affect, emotional states, anxiety sensitivity, and clinically-relevant symptoms of psychopathology work independently and together to constitute a vulnerability for substance abuse (Wise, 1988). A wide range of positive and negative psychophysiological effects including appetitive, aversive motivational systems, and affective states also have been associated with substance abuse (Correia, Carey, & Borsari, 2002; Hodgins, el-Guebaly, & Armstrong, 1995). Studies indicate that many substance abusers experience poor tolerance for unpleasant bodily sensations and negative emotional states which, consequently, may lead to continued substance use and/or increase risk for relapse to substance use following a period of abstinence. For example, studies have shown that positive affect and the experience of negative emotional events are associated with increased risk for substance dependence (Hull, Young, & Jouriles, 1986). In addition, Carpenter and Hasin (1999) demonstrated that relapsed alcohol-dependent patients often identify negative somatic and emotional states as causal factors in relapse, a finding consistently replicated in laboratory-based studies. For example, Cooney et al., (1997) found that negative affect enhanced the effects of alcohol cue presentation on the elicitation of alcohol urges and prediction of time to relapse.

Recent efforts to investigate the role of interoceptive sensitivity and negative affect in substance abusing populations have adopted several constructs from the anxiety literature, namely anxiety sensitivity (Stewart, Samoluk, & MacDonald, 1999). Reiss (1991) described anxiety sensitivity as a tendency to respond fearfully to the occurrence

of symptoms of anxiety. Not only is anxiety sensitivity an important feature of several models of anxiety symptomatology (Reiss, 1991; 1997), but it is often associated with other psychological factors, such as negative emotionality (Lillienfeld, 1997) and depression (Taylor, Koch, Woody, & McLean, 1996).

One assumption about anxiety sensitivity in the context of substance abuse is that drug use functions to attenuate fear, negative affect, and arousal sensations. Therefore, substances may be used to avoid or minimize the occurrence or recurrence of anxiety-related symptoms (McNally, 1996; Stewart et al., 1999). Individuals who meet diagnostic criteria for substance abuse or dependence typically score significantly higher than average on anxiety sensitivity compared to nonclinical samples (e.g., Karp, 1993). In addition, anxiety sensitivity is predictive of frequency of drug and alcohol abuse (DeHaas, Calamari, & Blair, 2004).

The levels of negative emotional states observed among substance abusers are far higher than the levels found in the general population (Clancy, 1997; Grisso, Davis, Vesselinov, Appelbaum, & Monahan, 2000; Reilly, Clark, Shopshire, Lewis, & Sorensen, 1994; Reilly & Shopshire, 2000; Tivis, Parsons, & Nixon, 1998). Substance abusers administered the Spielberger State-Trait Anxiety Inventory (Grisso et al., 2000) typically have been shown to (a) have higher state and trait anxiety, (b) be more likely to express their feelings onto others, and (c) have less control of their feelings than controls (DeMoja & Spielberger, 1997). Consequently, reducing levels of negative emotional states is now seen as an important feature of recovery programs (see Appendix B for additional information regarding common approaches in residential treatments and issues related to treatment outcome). Marlatt (1985) emphasized the importance of emotional

states as triggers for relapse. He noted that 40% of relapses are related to emotional conflicts and associated states (e.g., anxiety and depression). A factor analysis of Marlatt's relapse taxonomy using the Reasons for Drinking Questionnaire (Zywiak, Coonors, Maisto, & Westerberg, 1996) showed that the predominant factor was negative emotion. In turn, negative emotion was positively associated with alcohol dependence, trait anxiety, and depression (Zywiak, Coonors, Maisto, & Westerberg, 1996). Litt, Cooney, and Morse (2000) reported that substance abusers with urges to use drugs and alcohol had higher degrees of dependence, anxiety, and depression than those without such urges.

Given the apparent centrality of negative affect, emotional states, and psychological symptomatology in the use of substances, the next logical step is to examine the role of these variables in treatment outcome and the malleability of the variables as a function of abstinence/treatment. One such study assessed experiential avoidance, controllability, anxiety sensitivity, and psychological symptoms in a residential substance-abusing sample (Forsyth, Parker, & Finlay, 2003). The authors recruited 94 predominantly male-veterans (96%) seeking substance use treatment at a Veterans Affairs Medical Center. Results found high anxiety sensitivity to be related to experiential avoidance, depression, and fears with bodily sensations associated with panic. In addition, high anxiety sensitivity was negatively correlated with general perceptions of controllability over anxiety-related events. Furthermore, patients who endorsed higher levels of anxious and depressive symptoms also reported greater tendencies to use emotional avoidance strategies and endorsed greater perceived uncontrollability. Post-treatment results revealed that improvement on the anxiety

sensitivity score was related to a decrease on anxious and depressive symptoms, as well as emotional distress. Findings from this study support the view that repeated use of substances are related to general emotional processes, negative affect, and a perceived inability to control one's life. In addition, these findings are consistent with Alcoholics Anonymous (AA) programs and their recognition that the substance users' life has become "unmanageable." Essentially, the study provides information about control over specific emotional and physiological experiences that may exacerbate the tendency to abuse substances. These results also provide support for the assumption that experiential avoidance, controllability, anxiety sensitivity, and psychological variables related to engagement in substance abuse are amenable to change as a result of treatment.

In a treatment research program, Guydish et al. (1998) conducted two studies to examine affect-variables as a predictor of treatment success across outpatient and residential substance abuse treatment. In the first study, individuals were assessed 2 weeks to 6 months after treatment. A total of 1, 944 patients were admitted to the treatment center. Participants were excluded from the study if they were court mandated ($n = 693$), homeless ($n = 495$), or ineligible for random assignment based on clinical judgment ($n = 222$). In total, 534 patients were included and randomly assigned to outpatient or residential treatment. Both groups were compared at baseline to assess pretreatment differences. At baseline, patients were assessed on depression (assessed through the Beck Depression Inventory [BDI; Guydish, 1998]) and other psychological symptoms (e.g., negative affect). It was hypothesized that patients with higher baseline BDI scores and psychological symptoms would have worse treatment outcomes (e.g., treatment adherence and abstinence) than would subjects with lower scores. At post

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treatment, outcome scores for both groups decreased by more than 50% after 1 month and remained at this level throughout the 6 month follow-up period. Further, residential patients reported greater gains than outpatients on psychological symptoms, including negative affect, but not on BDI scores. Individuals who evidenced a decrease on these variables reported a statistically significant improvement on treatment outcome variables. However, those whose BDI scores and psychological symptoms stayed constant fared worse. Although both groups evidenced significant changes on outcome scores from pre- to post-treatment, the fact that court mandated and homeless individuals were not included in this study warrants empirical scrutiny. Specifically, residential treatments often provide services to individuals under these circumstances (i.e., court ordered), therefore leaving the generalizability of these results questionable.

The second study by Guydish et al. (1999) assessed these same individuals 18 months after entering outpatient or residential substance abuse treatment. Residential and outpatient groups showed significant changes over time; however, between-group comparisons at post-treatment suggested that patients in residential treatment reported fewer psychiatric symptoms and significantly lower scores on depression. As noted, these results should be cautioned as the most problematic substance abusers were excluded from this study. Overall, the findings from this study suggest that patients assigned to outpatient or residential treatment do indeed reveal changes over time on outcome measures including psychiatric symptoms, BDI scores, and substance use. More importantly, these variables evidenced predictive power in terms of abstinence following treatment irrespective of treatment setting. It is noteworthy that treatment dropout during the first 2 weeks was lower in the residential treatment group, suggesting that this form of

treatment may be more effective in preventing relapse or more restrictive with regards to continuation of substance use.

One recent study examined the role of depressive symptomatology in predicting drug abstinence at discharge from outpatient substance abuse treatment (Dodge, Sindelar, & Sinha, 2005). Data were collected from 827 patients admitted to the Yale University School of Medicine's Substance Abuse Treatment Unit (SATU). Clinically significant levels of depressive symptoms, as per DSM-IV criteria were assessed upon treatment entry. In addition, participants were assessed on demographic (age, gender, ethnicity, education level, primary drug of use, and referral source) and treatment characteristics (i.e., length of time spent in treatment). Results suggested that higher depressive symptomatology scores significantly predicted a decreased likelihood of patients' abstinence at discharge. Furthermore, these findings remained significant even after accounting for other significant demographic and treatment variables. Similar studies have found that higher levels of affect among substance abusers predicts worse treatment outcomes among cocaine users (e.g., Carroll et al., 1993; Wolpe et al., 1993), opiate addicts (e.g., Kosten et al., 1986; Rounsaville et al., 1986), and alcoholics (Greenfield, 1998; Hasin, 2002). Overall, these data indicate that affect variables are an important factor for shaping successful substance abuse treatment outcomes.

In addition to studies that have evidenced affect-related variables as a predictor of treatment success (Guydish et al., 1998, 1999), a number of large-scale treatment outcome studies supported by National Institute on Drug Abuse (NIDA) found affect variables themselves to change throughout treatment. For example, Gossop, Marsden, Stewart, and Kidd (2003) reported 5-year outcomes from patients in the National

Treatment Outcome Research Study (NTORS). Four broad treatment modalities including inpatient, residential, methadone maintenance, and methadone reduction programs were studied. Results indicated that levels of anxiety and depression were reduced by 45% when compared to scores at intake in all groups. Additionally, across groups there were also statistically significant reductions in reported crime (e.g., drug-selling, arrests) between intake and follow-up. Overall, these data suggest that each of the four treatment types resulted in significant reductions in anxiety, depression, drug use, and engagement in crime-related incidents. However, no indication of the degree to which change in mood variables relate to substance abuse treatment success was provided. Specifically, no information was given regarding how much of the variance each of these variables accounted for in treatment success. The Drug Abuse Reporting Program (DARP), another NIDA-supported study, was designed to assess patients entering drug abuse treatment. Data were collected on 44,000 patients across the following treatment conditions: methadone maintenance, outpatient drug free, and long-term residential programs. Follow-up sessions occurred at 1 to 5 years post treatment. Results suggested that, despite the type of treatment setting, patients had statistically significant reductions in psychological symptoms, and levels of heroin use and other illicit drug use. Specifically, scores on psychological profile (including affect) and incidents of drug-related crime were found to decline during treatment and remained lower than baseline scores at post-treatment (Hubbard et al., 1997). Overall, data from DARP indicated that each of the three treatment types resulted in improvements on psychological symptoms, reductions in drug use, and involvement in criminal activities. Thus, in addition to improving levels of psychopathology, this study provides evidence of

the effectiveness of substance abuse treatment in interrupting early criminal behaviors and drug abuse (Hubbard et al., 1997).

On the basis of this review, there are compelling data regarding the singular, as well as joint influence, of affect-related variables on engagement and success in substance abuse treatment in general (Anglin et al., 1997; Hubbard et al., 1997; Zhiwei, Friedmann, & Gerstein, 2003). As such, these variables have been examined as predictors of treatment and have demonstrated noticeable changes over the course of treatment. For example, positive change scores on anxiety sensitivity were indicative of improvement on depressive and anxiety symptoms. Also, a decrease in anxiety symptoms and depression measures, as well as decrease in criminal activities and drug use irrespective of treatment setting was revealed. One question that cannot be addressed by this review is whether change in affect-related variables is necessary for the substance abuse change (i.e., mediator) or affect-related variables change as a function of and therefore subsequently to relapse, both of which are beyond the scope of this paper. In addition to state-level affect changes, we now outline the role of personality-related variables across the disinhibition spectrum (i.e., impulsivity and risk-taking propensity) and their relationship to substance abuse (Bickel, 1999; Depue & Collins, 1999; Eysenck & Eysenck, 1977; Lejuez et al., 2002; Lejuez, Simmons, Aklin, Daughters, & Dvir, 2004; Sher et al., 1999). A review of these variables and the changeability of these patterns during treatment will follow.

Personality-Related Variables on Substance Abuse and Treatment Outcome

Researchers and clinicians have long adhered to the belief that personality-related variables, particularly those along the trait-disinhibition continuum, play an important

role in engagement in substance abuse (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005; Eysenck, Pearson, Easting, & Allsopp, 1985; Krueger et al., 2002; Lejuez, Aklin, Bornovalova, & Moolchan, 2005; Sher, Bartholow, & Wood, 2000). Specifically, these determinants of trait-disinhibition have been found to be composed of several constructs, as indexed by self-report and laboratory tasks, including impulsivity and risk-taking propensity (Sher et al., 2000). Although several definitions of impulsivity have been proposed in the literature, it is commonly referred to as the tendency to enter into situations or rapidly respond to cues for potential reward without much planning or deliberation and without consideration of potential punishment (Eysenck, Pearson, Easting, & Allsopp, 1985). Risk-taking involves one's decision to engage in a particular behavior resulting in a balanced probability of positive or negative consequences (Jessor, 1998; Leigh, 1999). Although risk-taking has been found to share common characteristics between impulsivity and other static personality traits (i.e., sensation seeking), risk-taking propensity is discernable (Eysenck & Eysenck, 1977; Wills, Sandy, & Yaeger, 2002; Zuckerman, 1991; Zuckerman & Kuhlman, 2000). For example, research indicates a positive feedback loop such that engagement in risky behaviors may affect current levels of these variables. That is, engaging in substance use may, through processes such as pharmacological influences, make an individual more disinhibited and thus more likely to engage in high risk behaviors (e.g., Pogge, Stokes, & Harvey, 1992).

The decision to engage in a particular risk taking behavior, though often well characterized by impulsivity and/or sensation seeking, at times may not be well characterized by these variables. For example, one could decide to engage in substance use with limited forethought or planning. Alternatively, one could decide to use

substances with much thought going into the decision. In this way, risk-taking propensity may be less of a single construct and more of a larger construct including a variety of other factors (Lejuez, Aklin, Bornovalova, & Moolchan, 2005).

Taken together, disinhibition represents a multidimensional construct that has been proposed to underlie the propensity to engage in substance use and is thought to have a biological, largely heritable basis. For example, the tendency for some individuals to persistently search for highly stimulating experiences has been attributed to a low activation of the behavioral inhibition system, experienced as a relatively low level of anticipatory anxiety (Fowles, 1980; Gray, 1982; Hare, 1978; Zuckerman, 1983). Similarly, others have noted that impulsivity and risk propensity are indicators of a core neurobiological process; namely, the underlying approach/avoidance system oriented toward engagement in hedonic behavior (Depue & Collins, 1999; Gray, 1987; Zuckerman, 1991; Zuckerman & Kuhlman, 2000). Others have rejected the theory that trait-personality variables form the primary basis for engagement in substance abuse, but rather they propose that it is the interaction between personality and environmental variables that is of primary importance (e.g., Nathan, 1988). Regardless of which etiological bent is operative, studies have documented a relationship between components of disinhibition (i.e. impulsivity, risk-taking propensity) and substance abuse (Krueger et al., 2002; Lejuez et al., 2002; Sher, Bartholow, & Wood, 2000; Tarter et al., 2003; Zuckerman et al., 1988).

Traditionally, researchers have assessed levels of disinhibition using self-report measures; however, the exclusive reliance on self-reports has several limitations, including failure to report one's own behavior accurately, potentially due to lack of

insight and/or cognitive ability on the part of the respondent. Another method for capturing disinhibition is through behavioral laboratory tasks. Although there are several types of behavioral laboratory measures, one measure of disinhibition involves the choice of a smaller immediate reward over a larger delayed reward (also referred to as delayed discounting). In these types of behavioral laboratory tasks, choosing the smaller immediate reward is considered to be an impulsive choice (Bickel, Kirby, Petry, & Bickel, 1999; Madden et al., 1997; Mitchell, 1999; Vuchinich, 1998). Using a delay discounting laboratory measure of impulsivity, Kirby, Petry, and Bickel, (1999) compared 50 subjects with heroin dependence and 60 healthy controls. They found that the tendency to discount the value of delayed rewards for heroin-dependent subjects was twice the rate in controls. Furthermore, the rate of discounting was positively correlated with impulsivity as measured by self-report questionnaires. In another study of alcohol-dependent subjects and controls, Petry (2001) used a delayed-reward laboratory measure of impulsivity to compare currently using alcohol-dependent subjects, abstinent alcohol-dependent subjects, and healthy controls. Alcohol-dependent subjects were shown to be more impulsive than controls, and within alcohol-dependent subjects, those who achieved abstinence were less impulsive than active users. A third study using delayed-reward measures in subjects with a history of substance abuse and controls found that individuals with a history of substance abuse were less able to tolerate delays for a longer reward (Allen, Moeller, & Rhoades, 1998).

As an alternative measure of disinhibition, researchers have begun to develop and utilize tasks that simulate situations under which real-world risk behaviors may occur (e.g., Allen, Moeller, Rhoades, & Cherek, 1998; Bickel, Odum, & Madden, 1999; Crean,

de Wit, & Richards, 2000; Mitchell, 1999; Vuchinich & Simpson, 1998). One such tool is the Balloon Analogue Risk Task (BART; Lejuez et al., 2002). The BART involves the inflation of a computer-simulated balloon, with greater balloon inflation associated with greater reward, under the contingency that at some point the balloon will explode and any accrued reward for that balloon is eliminated. Therefore, in deciding how much to inflate each balloon, participants must balance potential gain against potential risk. Riskiness on the BART was shown to be related to engagement in substance use in both adults (Lejuez et al., 2002; Lejuez et al., 2004) and adolescents (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005; Lejuez, Aklin, Zvolensky, & Pedulla, 2002). Further, the relationship of the BART and the real-world risk-taking behaviors was evident even after controlling for other self-reported disinhibition variables, including impulsivity and sensation seeking.

More recently, Lejuez and colleagues have conducted a series of studies examining disinhibition and substance abuse on both a general level and across drug classes among inner-city substance abusers (Bornovalova, Daughters, Hernandez, Richards, & Lejuez, in press; Lejuez, Simmons, Aklin, Daughters, & Dvir, 2004). In a preliminary investigation, Lejuez et al., (2004), examined the relationship between risk-taking propensity and risky sexual behavior (e.g., exchange sex for drugs, sex without a condom) in a sample of treatment seeking drug users. Participants included 76 inner-city substance users, who were assessed on levels of sexual risk, impulsivity, depression, self-esteem, and risk propensity as indexed by the BART. Results indicated that impulsivity, self-esteem, and risk propensity were independently related to risky sexual behavior. Furthermore, risk propensity evidenced incremental validity above and beyond that provided by demographic variables, impulsivity, self-esteem, and depression. Prior to this

study, researchers have not integrated a behavioral assessment measure to tap disinhibition among inner-city substance abusers. Although Lejuez and colleagues did not assess substance use patterns specifically, other studies have indicated that substance use is associated with engagement in various sexual risk behaviors, including the exchange of sex for drugs (e.g., Bux et al., 1995; Camacho et al., 1997; Grella et al., 1995; Joe & Simpson, 1995). Additionally, while Lejuez et al., (2004) provide important results among a unique sample of substance abusers, participants were only assessed at one time point. Therefore, information about the extent to which levels of disinhibition as indexed by behavioral tasks, change as a function of treatment cannot be gleaned from these findings.

Taking a more focused approach to risk propensity and substance abuse, Bornovalova, Daughters, Hernandez, Richards, and Lejuez (in press) examined differences between risk propensity and impulsivity among primary users of crack/cocaine and heroin users. Specifically, individuals who were primary users of either crack/cocaine or heroin (i.e., use of the drug at least 2-3 times per week over the past year), and not primary users of the other drug (i.e., use of the drug less than once per month over the past year) were included in the study. Risk-taking propensity was assessed using the BART and impulsivity using the Delayed Discounting Task. Initial results indicated that crack/cocaine users were significantly more risky and impulsive than heroin users, despite the absence of acute drug effects. After controlling for age and gender, the difference in the two groups remained significant for the Delayed Discounting Task, but was reduced to non-significant for the BART.

Despite these encouraging findings that indicate a significant association between trait-disinhibition and substance abuse, no studies have examined these variables as predictors of treatment outcome, as well as investigated the changeability of these predictors throughout substance abuse treatment. Because personality variables are often considered to be long standing patterns of behavior, this may be why they have not been examined in this way. Therefore, the extent to which disinhibition variables are amenable to change as a function of substance abuse treatment has not yet been documented.

Theoretical Implications across Affect- and Personality-Related Dimensions

Understanding changes in affect- and personality variables among substance abusers would be beneficial in terms of prevention and treatment development efforts. However, to truly understand this relationship, it is important to first highlight potential theoretical frameworks that may guide this work. The most widely accepted framework comes from the social-cognitive model developed by Bandura (1994). The social cognitive model explains how individuals acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies. Thus, evaluating behavior change depends on factors such as environment and one's behavior. The major thrust of the model centers on awareness and knowledge of substance abuse and their resulting behaviors are fundamental principles for control and behavior change. Yet, a number of studies have shown that dissemination of information alone is rather limited in preventing or reducing substance abuse (Kar, 2001; Kelly & Kalichman, 2002). In addition to providing information to facilitate change, it also seems critical to have the behavioral means, resources, and social supports (i.e., Bandura, 1994). Above and

beyond behavioral capabilities and resources, there is a sizable gap between simply

possessing self-regulatory skills and being able to use them effectively under difficult

circumstances, which requires belief in one's efficacy to exercise personal or impulse

control. The sense of personal control or perceived self-efficacy often stems from past

positive and/or negative consequences of coping with life stressors. Thus, in guiding

one's behavior, self-regulatory skills, including *affective* reactions to one's own conduct

are important constructs to consider. Such skills will determine the potential situations in

which an individual may find the necessary skills to resist social pressures and

engagement in substance use that will lead to behavior change.

In examining Bandura's model with more specific attention to affect- and

personality variables and their relationship to engagement in substance use, several

important variables emerge. Namely, factors such as impulsivity, risk-taking propensity,

and level of pathology all have been found to contribute to the theoretical understanding

of substance abuse. There is an empirical link between each of these variables (Ravndal

& Vaglum, 2002; Simpson, Joe, & Brown, 1999).

Sample-Related Issues

In beginning to target the understanding of how personality-related variables may

or may not change in the course of treatment, it is crucial to be clear about the type of

treatment and setting of interest. Although several options could represent a starting

point, researchers have identified inner-city substance users in residential treatment as

being especially vulnerable to relapse following substance abuse treatment (e.g., Ravndal

& Vaglum, 2002; Simpson, Joe, & Brown, 1999; Stark, 1992). Perhaps because this

patient group is often exposed to high risk situations and environments is reason to believe why this subpopulation is most susceptible for engaging in such behaviors (Kral et al., 1998). Although research indicates that impulsivity and risk taking may be related to substance use at a more general level, more recent work indicates that these relationships differ across drug classes. Most of this work, however, has focused primarily on crack and heroin use together and less attention to other drug classes (Avants, Marcotte, Arnold, & Margolin, 2003; DHHS, 2003; Ensminger, Anthony, & McCord, 1997).

Indeed, participation in substance abuse treatment is generally associated with a reduction in substance use and high risk resulting behaviors (e.g., unsafe sex, sharing needles; Sorensen & Copeland, 2000). However, inner-city settings remain a grossly underserved population. Only a few studies, conducted by our center, have examined the potential relevance of affect and disinhibition variables to inner-city substance users in residential treatment (e.g., Bornovalova, Daughters, Hernandez, Richards, & Lejuez, in press; Daughters, Lejuez, Kahler, Strong, & Brown, 2005; Lejuez et al., 2004). Generally speaking, inner-city substance abusers have been found to be significantly more risky and impulsive than other sub-groups of substances abusers (Bornovalova et al., in press). Unanswered questions remain regarding the relationship of affect- and personality-related variables as predictors of treatment outcome and the changeability of these variables throughout the course of treatment exclusively with inner-city, substance-using samples. Future studies should discern the extent to which tailoring substance abuse treatments to targeted populations influence effectiveness.

Despite widespread advances in assessment and treatment domains, substance use (e.g., drug, alcohol), dependence, and addiction continue to be prevalent problems that compromise health, quality of life, and cost to society (Harwood, 2000). A great deal of research over the past three decades has focused on developing and evaluating treatments for substance abuse. Although treatment facilitates abstinence for a number of individuals (e.g, Gossop, Marsden, Stewart, & Treacy, 2002), many patients often relapse soon after treatment (Ravndal & Vaglum, 2002; Simpson, Joe, & Brown, 1999). Inner-city substance users are an underserved group that experience greater levels of substance abuse, and are thereby at a heightened risk for treatment failure (i.e., relapse) than other subpopulations (Avants, et al, 2003; DHHS, 2003; Ensminger, et al, 1997). Despite the clinical enthusiasm and promise of preliminary studies with community-based programs for substance users (Anglin et al., 1997; Hubbard et al., 1997; Zhiwei, Friedmann, & Gerstein, 2003), future research must investigate how to improve retention and identify the mechanisms of change occur during treatment, as well as adequate ways to measure them. The current study represents a first step in an attempt to disentangle factors that are amenable to change during treatment, thus setting the stage to begin to examine the changeability of affect and personality variables throughout the course of treatment.

Chapter 2: Rationale for the Current Study and Design Overview

The extant literature indicates a substantial association between affect-and personality-related variables and substance abuse. However, evidence supporting these predictors as outcomes and the degree to which they change as a function of substance

abuse treatment points toward affect-related variables, as there have been no studies examining this with personality-related variables. Of the studies that have examined affect-related variables as treatment outcome variables within a residential setting, most typically exclude problematic patients (e.g., Guydish et al., 1998, 1999). Excluding these individuals reduces the generalizability of these studies. Furthermore, residential substance abuse treatments are likely to be the most intensive form of treatment and often the last option in place of incarceration. As such, residential treatment programs are likely to accommodate the most problematic patient groups, including those who are court referred, have high levels of substance use severity, or report high levels of negative affect and trait-disinhibition. For these reasons, it is important to examine the extent to which affect-and personality-related variables change during the course of residential substance abuse treatment. Accordingly, the current study examined the impact of residential substance abuse treatment on affect- and personality-related variables with inner-city substance abusers over a 30-day course of treatment. It is important to note that the current study did not examine relapse following treatment, given the overarching focus to explore changes that occur during treatment. Thus, these data may be used to develop more elaborate future studies that examine changes mediating attrition and subsequent relapse. To assess changes on affect- and personality-related variables while simultaneously eliminating systematic order effects due to the repeated administration of measures, participants were separated into 2 groups. Specifically, the first was assessed at pre- and post-treatment and the second only at post-treatment (see Procedures for detailed information regarding groups). Irrespective of the group status, participants were

compared on demographic information to permit more confidence that our results were attributed to the influence of treatment, as opposed to pre-testing on the measures.

Chapter 3: Method of the Current Study

Participants

The current sample included 81 adults between the ages of 18-56 years, sampled from consecutive admissions at the Salvation Army Harbor Lights residential drug treatment facility located in Northeast Washington, DC. Demographic data for the proposed study was similar to previous studies conducted at the site (e.g., Lejuez et al., 2004). In particular, the sample was two-thirds male, 90% African American, average age was in the late 30's, and on average, most only had a high school education. Participants were recruited when they first enrolled at the treatment facility. Each participant was asked if they would like to participate in a study examining changes in behavior and personality. The only exclusionary criterion was psychosis, although variables such as psychological disorders and medications prescribed were assessed and addressed statistically as appropriate. Participants were told that involvement in the study was completely voluntary and would not affect their status at the facility should they refuse participation (center staff do not have access to such information). More detailed recruitment information is provided below.

Residential Treatment Facility

The Salvation Army Harbor Lights residential substance abuse treatment facility is a public, non-profit, 64-bed inpatient center that serves adult men and women with

substance abuse dependence (e.g., alcohol, marijuana, cocaine, and heroin). Individuals who request treatment often are referred from various sources, including legal services (i.e., court-mandated, probation/parole), community shelters, social services, and self-referrals. During the initial phase, before being admitted into the treatment facility, patients are required to undergo detoxification lasting between 7 to 21 days. Treatment at the center involves sessions focused on functional analysis, as well as a variety of strategies adopted from Alcoholics Anonymous and Narcotics Anonymous. In addition to didactic lectures, sessions are provided in individual and group format within a full day, seven days a week. Medication assessment and monitoring is provided for patients throughout the course of treatment for conditions requiring such attention (e.g., psychological, medical). Treatment contracts typically are 30, 90, and 180 days. The center requires complete abstinence from drugs and alcohol, with the exception of caffeine and nicotine; weekly drug testing is mandatory and any use is grounds for dismissal. Aside from scheduled activities (e.g., group retreats, physician visits), residents are not permitted to leave the center grounds during treatment. During the final stages of the residential program, the focus shifts outward, supporting the patient to make independent employment and living arrangements. Therefore, in aftercare, patients no longer live in the residential setting but participate in individual and group therapy on an outpatient schedule. The training level of staff at the program includes a range of doctoral and master's level clinicians and substance counselors (information about the type of treatments patients undergo is listed in Appendix C).

Assessment sessions occurred twice per week in a meeting room at the Salvation Army Harbor Lights Treatment facility. The Center Director granted permission to access patients every Tuesday and Friday until completion of the study. Previous studies conducted at the facility over the past three years have been very successful with regard to recruitment. To date, Dr. Lejuez's Center has successfully recruited over 800 subjects across 8 studies with less than 5% declining participation.

The initial assessment session for participants occurred on either the first Tuesday or Friday during a 3-day window (i.e., 4th, 5th or 6th day at the center). Assessments did not take place until a patient's 4th day in the center largely because patients tended to be inundated with forms and other standard in-take procedures at the center. Specifically, combined with required off-site detoxification *prior* to entering the center on an as needed basis, this time frame allowed adequate time for acclimation to the center and to further ensure that the patient's acute withdrawal symptoms had subsided.

All participants began by providing informed consent and completed a basic demographics form, including a thorough description of the study. Specifically, the form explained that all participants will first be paid $5 for completing a basic demographic form, followed by assignment to 1 of 2 groups. Participants were assigned, on an alternating basis across two groups. Those assigned to the pre-post group continued to participate for an additional hour to complete self-report and behavioral measures indexing their drug use history, personality characteristics, and mood states. Participants in the pre-post group received an additional $20 at the end of this session. They also were informed that they would be asked to complete the same measures 30 days later and

could earn up to an additional $20 (a total of $45). However, if assigned to the post only group, they would only need to complete a demographic questionnaire and then will be finished for the day, but would be expected to complete the same assessment as the pre-post group in 30 days where they could earn up to $20 (a total of $25).

   Pre-Post Group. Upon entry into the study, 41 participants assigned to the pre-post group completed a battery of 7 questionnaires to assess demographics, impulsivity, depressive and anxiety-related symptomatology, experiential avoidance, drug use history, and behavioral measures including delayed discounting and the Balloon Analogue Risk Task. All measures were administered in random order. As participants completed questionnaires, individuals who were trained in administering the behavioral task accompanied participants one by one to an adjacent room to complete the task. To ensure that participants had incentive to perform their best, they were told that the better they perform on the behavioral tasks the more money they would earn. A member of our research team was made available at all times to answer any questions.

   After participants completed questionnaires and the behavioral tasks, they were told the amount of money they have won and asked to sign a receipt. Money earned from the study was deposited in the participants account at the facility on the next business day. Each session lasted no more than 60 minutes. They were paid between $10 and $20 depending on their performance on the behavioral task (total score). Study participants were reassessed on either of their last 3 days of treatment (i.e., 28th, 29th or 30th day at the center), which they completed the same procedures and payment (between $10 and $20 based on their performance).

Post-Only Group. Participation for the post-only group was exactly the same as the 30-day reassessment given to the pre-post group. Specifically, 40 participants received demographics at pre-treatment and the remaining questionnaires at post-treatment. Of note, these data allowed pretreatment comparisons of individuals from both groups and eliminate systematic order effects due to the repeated administration of questionnaires and behavioral tasks.

<u>Questionnaires</u>

Participants completed a variety of questionnaires examining the extent to which levels of anxious and depressive symptomatology and measures of disinhibition variables change as a function of continuation in residential drug treatment.

Demographics. To measure and account for individual differences, participants provided basic demographic information including age, gender, education level, occupation, home occupants, and socioeconomic status. A copy of the demographics form is listed in Appendix D.

Acceptance and Action Questionnaire (AAQ; Hayes et al., 2002). The AAQ is a 22-item measure that assesses experiential avoidance, or the tendency to avoid or alter unwanted internal experiences, primarily in the form of emotions. Participants rated the degree to which each statement applied to them using a 7-point Likert scale (0 = never true to 7 = always true). Higher AAQ scores correspond to high experientially avoidant tendencies. There is evidence for the convergent and divergent validity of the AAQ as well as adequate internal consistency (α = .70; Hayes et al., 1996). Good test-retest reliability (r = .85) over a 30-week interval was reported for the AAQ. Further

establishing its psychometric properties, Forsyth et al., (2002) found that the alpha

coefficients ranged from .88 to .90. Internal consistency of the AAQ in this sample was

good (α = .74). The AAQ is listed in Appendix E.

State-Trait Anxiety Inventory (STAI; Speilberger, Gorsuch, & Lushene, 1983).

The STAI is a 40-item measure used to assess state and trait anxiety. The state scale

measures the more transient anxiety experienced in a specific immediate situation

(Speilberger, Gorsuch, & Lushene, 1983), whereas the trait scale measures individual

differences in the perception of stress and in the overall pattern of responses to stressful

or anxiety provoking situations. The STAI has been well validated in a variety of

populations, including substance users (Donham & Ludenia, 1984). Internal consistency

of the state scale in the current study was adequate (α = .69) and poor for the trait scale (α

= .60). In addition, evidence of construct and concurrent validity has been established. A

copy of the STAI is given in Appendix F.

Center for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977).

This scale was used to assess differences in depressive symptoms. The CES-D is a 22-

item self-report inventory designed to measure current depressive symptomatology in the

general population. This scale was designed for use in non-psychiatric settings and was

therefore appropriate for assessing the depressive symptoms of this population. The focus

of the scale is on affective components of depressive symptomatology and includes

depressed mood, feelings of guilt and worthlessness, feelings or helplessness and

hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. High

internal consistency has been demonstrated in general (Chronbach's α = .85) and patient

(Chronbach's α = .90) samples. Six-month test-retest reliability on individuals reporting

no negative life events was adequate (r = .54). Discriminant validity was high between psychiatric inpatients and the general population (Radloff, 1977). Additionally, this measure correlates strongly (r =.87) with the Beck Depression Inventory (Santor et al., 1995). The alpha coefficient for the CES-D in the current study was acceptable (α =.76). Refer to Appendix G for a copy of the CES-D.

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). This 20-item measure was used to assess differences in positive and negative mood. The scale assesses both positive (PA) and negative (NA) affect. PA is the extent to which a person feels enthusiastic, alert, and active. NA is the extent to which a person's subjective distress is characterized by a number of negative mood states including anger, contempt, distrust, and guilt. NA is related to self-reported stress and poor coping (Clark & Watson, 1988) and frequency of unpleasant events (Stone, 1981). The correlation between the two scales is low (r = -.12 to -.23), suggesting that the two scales measure independent constructs and thus, can be examined separately. It has also shown strong discriminant and convergent validity, indicating the measure is sufficiently discriminable from related constructs such as depression and state anxiety (Watson, 1988). Internal consistency of the PANAS in the current study was good (α = .70). Refer to Appendix H for a copy of the PANAS.

Delay Discounting Procedure (Kirby & Marakovic, 1996; Monterosso et al., 2001). Delay discounting refers to the degree to which an individual shows preference for either small, readily available rewards or larger, delayed rewards. This procedure is a paper-and-pencil version of the original monetary-choice questionnaire (Kirby & Marakovic, 1996) that has extensively been used in research on sensation-seeking,

impulsivity, and risk-taking, and has been found to correlate highly with other behavioral measures of impulsivity (Monterosso et al., 2001; Madden et al., 1997). This measure consists of a fixed set of 27 choices between smaller, immediate rewards and larger delayed rewards. For example, "Would you prefer $54 today OR $55 in 117 days?" The presentation order is contrived to not correlate choice amounts, ratios, differences, delays or discount-rates implied by indifference to the two rewards. From the responses an estimate "k" is derived to indicate level of impulsivity. Detailed information about the DDP is provided in the behavioral task section. A copy of the Delay Discounting Procedure is listed in Appendix I.

Drug Use Questionnaire (DUQ; Grant, Contoreggi, & London, 2000). To assess polysubstance use, the DUQ was administered. Specifically, participants were asked if they have ever used a particular drug in their lifetime, how often they used it in the past year prior to treatment, and how often they used the drug during the period of their life when they were using it most frequently. Participants answered the latter two questions on a 6-point scale ranging from "never", "one time", "monthly or less", "2 to 4 times a month", "2 to 3 times a week", and "4 or more times a week." The drug categories included: (a) cannabis, (b) alcohol, (c) cocaine, (d) MDMA, (e) stimulants, (f) sedatives, (g) opiates, (h) hallucinogens (other than PCP), (i) PCP, (j) inhalants, (k) and nicotine. Refer to Appendix J for a copy of the DUQ.

Eysenck Impulsivity Scale (EIS; Eysenck, Pearson, Easting, & Allsopp, 1985). The EIS is a 54-item forced choice measure that taps impulsiveness (19 items), venturesomeness (similar to sensation seeking; 16 items), and empathy (19 items). For each of these three scales, items were scored dichotomously with higher scores indicating

greater endorsement of the construct. The empathy subscale consists of items that are unrelated to risk and will be examined in the present study as an index of discriminant validity. Eysenck et al. (1985) found that the alpha coefficients were .84, .85, and .69 for impulsiveness, venturesomeness, and empathy, respectively. Furthermore, alpha coefficients for males have been reported .84, .85, and .69 for impulsiveness, venturesomeness, and empathy, respectively; and females .83, .84, and .69 for impulsiveness, venturesomeness, and empathy, respectively; Eysenck et al. 1985. Internal consistency of this scale in the current study was acceptable (α = .72). A copy of the EIS is given in Appendix K.

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), is a 36-item, self-report measure that assesses individuals' typical levels of difficulties in emotion regulation. Participants rated each item using a 5-point Likert scale (1 = *almost never*, 5 = *almost always*) based upon the extent to which it corresponds with how they respond to uncomfortable emotional experiences. The DERS provides a total score representing overall difficulties in emotion regulation, as well as 6 subscale scores: (a) non-acceptance of emotional responses, (b) difficulty engaging in goal-directed behavior when distressed, (c) impulse control difficulties when distressed, (d) lack of awareness of emotions, (e) limited access to strategies for regulation, and (f) lack of emotional clarity. The DERS has been found to have adequate construct and predictive validity and good test-retest reliability over a period of 4 to 8 weeks (ρ_I = .88; Gratz & Roemer, 2004). The DERS also has been found to be negatively correlated with an experimental measure of emotion regulation (assessed as willingness to experience distress in order to pursue goal-directed behavior) within a clinical population (r = -.63; Gratz, Rosenthal, Tull, Lejuez,

& Gunderson, in press). Higher scores correspond to greater difficulties. Internal consistency of this scale in the current study was excellent ($\alpha = .80$).

Behavioral Tasks

The behavioral tasks were used to assess levels of impulsivity and risk propensity. Participants completed the BART and Delayed Discounting Task. A description of both tasks is provided below:

Balloon Analogue Risk Task (BART; Lejuez et al., 2002). To assess impulsive-risk-taking propensity, the BART was administered. This measure has been used successfully to describe currently occurring risk behaviors in young adults (Lejuez et al., in press; 2002) and middle adolescents (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005; Lejuez, Aklin, Zvolensky, & Pedulla, 2003). In this task, the BART was presented on the computer in the classroom. Specifically, the computer screen displayed a small simulated balloon accompanied by a balloon pump, a reset button labeled "Collect $$$," a permanent money earned display labeled "Total Earned." Participants were then directed to pump the simulated balloon to earn as much money as possible, taking into consideration that the balloon can pop at any time. Each click on the pump inflated the balloon one degree (about .125" in all directions). With each pump, 2 cents was accumulated in a temporary bank (this amount was indicated to the participant). Participants were told the optimal number of pumps for each balloon was 64 pumps. After a balloon is pumped past its individual explosion point, a "pop" sound effect generated from the computer. When a balloon exploded, all money in the temporary bank was lost and the next uninflated balloon appeared on the screen.

At any point during each balloon trail, the participant had the opportunity to stop pumping the balloon and click the "Collect $$$" button. Clicking this button transferred all money from the temporary bank to the permanent bank, during which the new total earned incrementally updated cent by cent while a slot machine payoff sound effect played. After each balloon explosion or money collection, the participant's exposure to that balloon ended, and a new balloon appeared until a total of 20 balloons (i.e., trials) were completed. These 20 trials were comprised of different balloon types, all with the same probability of exploding. Participants were not given any detailed information about the probability of an explosion, but instead told that the best strategy would be to pump each balloon 64 times. They were also told that at some point each balloon will explode and this explosion could occur as early as the first pump all the way up to the point at which the balloon expands as large as the computer screen (see instructions below). The probability that a balloon will explode is arranged by constructing an array of N numbers. The number "1" is designated as indicating a balloon explosion. With each pump of the balloon, a number was selected without replacement from the array. The balloon explodes if the number 1 is selected. For this experiment N equaled 128. Thus, the probability that the balloon exploded on the first pump was 1/128. If the balloon did not explode after the first pump, the probability that the balloon exploded was then 1/127 on the second pump, 1/126 on the third pump and so on up until the 128th pump at which the probability of an explosion will be 1/1 (i.e., 100%).

According to this algorithm, the average breakpoint is 64 pumps. Modeling real-world situations in which excessive risk often produces diminishing returns and increasing threats to one's health and safety, each successive pump on any particular

balloon trial (a) increases the amount to be lost due to an explosion and (b) decreases the relative gain of any additional pump. For example, after the first pump the next pump risks only the 2 cents accrued in the temporary bank and would increase the possible earnings on that balloon by 100%, yet after the 20th pump, the next pump risks 3 dollars accrued in the temporary bank and would increase possible earnings on that balloon trial only by 1.6%.

Prior to starting the BART, the experimenter thoroughly explained the task accompanied by the following directions:

Throughout the task, you will be presented with a number of balloons, one at a time. For each balloon you can click on the button labeled "Press This Button to Pump Up the Balloon" to increase the size of the balloon. You will accumulate 2 cents in a temporary bank for each pump. Although the amount per pump will be shown, you will not be shown the amount you have accumulated in your temporary bank. At any point, you can stop pumping up the balloon and click on the button labeled "Press to Collect $$$." Clicking this button will start you on the next balloon and will transfer the accumulated money from your temporary bank to your permanent bank labeled "Total Earned."
It is up to you to decide how much to pump up each balloon. A balloon could pop between 1 and 128 pumps and <u>the average balloon will pop at 64 pumps</u>. Thus, although there is no telling when any particular balloon will explode, your overall best

strategy is to pump 64 times one average for each balloon. If the balloon pops before you click on "Collect $$$," then you move on to the next balloon and any money in your temporary bank is lost. Exploded balloons do not affect the money accumulated in your permanent bank. In total there will be 20 balloons. Try to get as many points as possible. At the end of the session we will take the number of points you have earned on your attempt on this task and the attempt on the other task, and compare these point totals with those of the other participants in the experiment. The amount of money you will receive will depend on your performance on the task. You will not know if your score is high enough until you are finished, so do your best the whole time. Good Luck!!!

Delay Discounting Procedure (DDP; Kirby & Marakovic, 1996). The DDP provides a measure of the degree to which an individual shows preference for either small, immediate rewards or larger, delayed rewards, which may be stated as the rate at which the subjective value of deferred rewards decreases as a function of the delay until they are received. Previous research has shown that individual's discount curves are well described by the following hyperbolic discount function (Mazur 1987): $V = A / (1+kD)$ where V is the present value of the delayed reward A at delay D, and k is a free parameter that determines the discount rate. All delays below are measured in days, and the values of k are scaled accordingly. As k increases the person discounts the future more steeply.

Therefore, *k* can be thought of as an *impulsiveness parameter*, with higher values corresponding to higher levels of impulsiveness.

The k values provided by the Kirby questionnaire fall within 10 discrete categories: .00016, .00025, .00063, .0016, .0039, .010, .0126, .065, .16, and .25; based on the answers to the 27 items, participants were assigned one of these k values. The Kirby questionnaire provided k values for high ($85, $80, $75), medium ($60, $55, $50), and low ($35, $30, $25) value delayed rewards. This DDP in its various forms (including questionnaire and computerized versions) has been widely used in research on sensation-seeking, impulsivity, and risk-taking, and has been found to correlate with other behavioral measures of impulsivity (Monterosso, Ehrman, Napier, O'Brien, & Childress, 2001). Further, the questionnaire version of this task has been found to discriminate drug users and non-users (Kirby, Petry, & Bickel, 1999).

At the start of the study, participants were shown a copy of the DDP and a verbal presentation of the instructions was given; a written version of the instructions also was provided at the top of the measure. The following script was read to participants:

This questionnaire includes 27 choices below. In each case, please circle the reward you would prefer: the smaller reward today or the larger reward in a specified number of days. Although your choices should be based on your actual preference, they are not for real money.

Design Considerations

Outlined below are design considerations that shaped the conceptualization of the project, procedures, and data analytic strategy (the latter is described in detail below).

First, relapse following participation in residential substance abuse treatment was not assessed primarily to limit the scope of this dissertation project to changeability of affect- and personality-related variables as a function of treatment, with the goal of extending this approach to relapse in future work based on the observed findings in this study.

Second, the impetus for dividing participants into 2 groups, with only one group having been assessed at pre-assessment was to be able to compare within and between-groups and eliminate the possibility of pre-testing effects. With regard to the latter, a number of clinical and research studies have evidenced improvement on self-report measures simply based on repeated administration (Anastasi & Urbina, 1997; Kaufman, 1990; Lazak, 1999). Indeed, such pre-testing effects provide the spurious appearance of improved function which makes the discernment of actual changes in variables of interest an arduous challenge for researchers. In an effort to diminish this problem, we assessed the first group at both pre- and post-treatment and the second only at post-treatment. Essentially, this design is the most robust test in order to have the ability to examine changes on affect- and personality-related variables as a function of treatment in absence of systematic pre-testing effects (Kazdin, 2005).

Third, the decision for not ruling out certain individuals, but rather including all consecutive patients was made largely to increase the generalizability of our findings. Specifically, our study reflected the characteristics of those patients who typically present for substance abuse treatment, particularly inner-city residential treatment. The differences revealed between the groups provides information regarding the extent to which affect- and personality-related variables change over the course of 30 days of residential substance abuse treatment. Although follow-up data beyond one month would

be valuable in ascertaining the long-range stability of our findings, this study represents a first step of a larger research program. However, future work will be developed to examine specific community-based substance abuse treatment programs, treatment duration, and long-term follow-ups.

Finally, the selection of the variables was a major point for the direction of the current study. Specifically, affect- related variables were selected because they have been long documented for their known link to engagement in substance abuse, their use as predictors of treatment outcome, and their malleability as a result of treatment. However, aside from research elucidating personality-related (i.e., disinhibition) variables and their relationship to substance use engagement, virtually no studies have examine these as predictors of treatment outcome, or how disinhibition changes as a function of treatment. In this way, affect-related variables served somewhat as a control variable, insofar as their frequently demonstrated ability to change as a function of treatment. However, because little is known about disinhibition in this regard we compared changes on both construct domains (affect and personality).

Data Analysis

Data analysis were focused on examining the extent to which scores on behavioral and self-report measures assessing affect- and personality-related constructs change across participation in 30 days of residential treatment:

- o *Hypothesis 1:* Examined the extent to which scores across each domain decreased from the pre-treatment assessment compared to the post-treatment assessment. Separate t-tests for the affect- and personality-related measures were used as the

primary test of significance. As recommended by Cohen and Cohen (1983), this

approach allowed for between-group comparisons without reliance on change

scores, which may have low reliability and may produce spurious relationships.

Participants were assessed across the following domains:

- Affect-related scores

    - Anxiety-related symptoms (anxiety sensitivity, experiential

      avoidance)

    - Depressive symptoms

    - Negative affect

    - Stress reactivity

- Personality-related (disinhibition) scores

    - Risk-taking propensity

    - Impulsivity (delayed discounting)

- *Hypothesis 2:* Examined the extent to which differences in hypothesis 1 persisted

  after controlling for group differences (pre-post vs. post-only group) at post-

  treatment. This second hypothesis was used to evaluate the extent to which

  changes from pre-treatment to post-treatment for the pre-post group were due to

  the effects of repeated administration of measures. Thus, between-groups

  ANOVAs were used to compare post-treatment scores from Group1 and Group 2.

Chapter 4: Results

Demographic Characteristics and Substance Use Patterns at Pre-Treatment for Group 1

Descriptive statistics for the baseline demographics and the various classes of drugs endorsed by individuals in the pre-post group who received both assessments are provided in Table 1. Specifically, for participants in the pre-post group ($n = 41$), the mean age was 38.0 years ($SD = 10.0$; range = 18 - 57), 83.3% were male and 94.8% African American. The remaining racial/ethnic composition of the sample was as follows: 2.7% Caucasian, 1.2% Hispanic/Latino, and 1.2% reported other. With respect to the highest level of education, 13.6% reported finishing 8th grade or less, 29.2% reported finishing some high school, 37.5% reported completing a high school degree or GED, 10.4% reported having attended some college or technical school, 1.2% reported completing college degree, and 1.2% reported having attended graduate school or obtained a graduate or professional degree. Income was transformed into a dichotomous variable (0 = all income levels between $0 - 9,999; 1 = income level of $10,000 and over). Furthermore, in terms of marital status, participants were categorized as either single (72.9%) or not single. Of those who were not considered single, 6.9% were married, 5.2% married but separated, and 17.2% were living with a partner as if married. With regard to employment status, participants were categorized as employed (19.0%) or unemployed (81.7 %). Whether individuals were employed part-time (1.7%) or full-time (15.5%) did not influence the results. The most frequently endorsed substance used at any one time for Group 1 was alcohol (72.4%), followed by marijuana (70.8%), crack/cocaine (58.3%), PCP (47.9%), opiates and hallucinogens (25.8%), stimulants (14.6%), sedatives (16.7%), and inhalants (8.3%). With regard to weekly use prior to admission into the

treatment center, rates of use were reported as follows: alcohol, 20.8%; marijuana, 20.8%, crack/cocaine, 37.5%; and opiates, 18.8%.

Descriptive Statistics for Affect- and Personality Indicators at Pre- and Post- Treatment for the Pre-Post Group

Means and standard deviations for all study variables at pre-treatment for the pre-post group are presented in the first column of Table 2. As for disinhibition scores at pre-treatment, mean and standard deviations for these measures were reported as follows: BART ($M = 41.7$, $SD = 11.8$), delay discounting ($M = 37.3$, $SD = 7.8$), and impulsiveness ($M = 9.31$, $SD = 4.5$). Furthermore, baseline scores of affective-related variables were reported as follows: experimental avoidance ($M = 96.0$, $SD = 9.7$), state anxiety ($M = 89.9$, $SD = 10.8$), trait anxiety ($M = 51.8$, $SD = 4.6$), positive affect ($M = 96.0$, $SD = 9.7$), negative affect ($M = 49.4$, $SD = 5.7$), depressive symptomatology ($M = 24.1$, $SD = 9.1$), and stress reactivity ($M = 36.1$, $SD = 12.2$). In regard to disinhibition variables at post-treatment, mean and standard deviations for these measures were reported as follows: BART ($M = 32.8$, $SD = 13.6$), delay discounting ($M = 37.1$, $SD = 7.8$), and impulsiveness ($M = 8.8$, $SD = 4.2$). Furthermore, post-treatment scores of affective-related variables were reported as follows: experimental avoidance ($M = 96.1$, $SD = 9.0$), state anxiety ($M = 89.9$, $SD = 9.9$)/trait anxiety ($M = 52.7$, $SD = 3.7$), positive ($M = 50.7$, $SD = 9.37$)/negative affect ($M = 30.9$, $SD = 5.3$), depressive symptomatology ($M = 17.2$, $SD = 10.4$), and stress reactivity ($M = 30.2$, $SD = 11.2$). Comparisons of these pre and post scores are provided below.

Relationships among Demographics, Self-Reported Affect- and Personality-Related

Measures within the Pre-Post Group

Correlations among Demographic Variables. The relationship among demographics variables for the pre-post group are presented in Table 3. Income level was related to employment status ($r = .34$, p < .01) and marital status ($r = .24$, p = .05), but was not related to age ($r = -.13$) or education level ($r = .11$). Age was related to marital status ($r = -.33$, $p < .01$) but no other demographic variables.

Correlations among Affect-Related Variables. A number of the affect measures were significantly related to each other at pre-treatment for the pre-post group. Experiential avoidance was significantly related to depressive symptomatology ($r = .59$, $p < .01$), emotion regulation ($r = .60$, $p < .01$), and stress reactivity ($r = .37$, $p < .05$). Depressive symptomatology was significantly related to stress reactivity ($r = .38$, $p < .05$), and negative affect ($r = .41$, $p < .01$). Emotion regulation difficulties was significantly related to depressive symptomatology ($r = .53$, $p < .01$) and stress reactivity ($r = .63$, $p < .01$). Furthermore, affect scores at post-treatment also yielded significant relationships between variables. For example, experiential avoidance was significantly related to state anxiety ($r = .29$, $p < .05$). State anxiety scores at post-treatment were significantly related to positive affect ($r = .58$, $p < .01$), and stress reactivity ($r = .34$, $p < .01$). Depressive symptomatology was significantly related to emotion regulation difficulties ($r = .69$, $p < .01$) and stress reactivity ($r = .56$, $p < .05$).

Correlations among Personality-Related Variables. There was no statistically significant relationship among the behavioral and self-report measures of disinhibition at pre-treatment. Specifically, self-reported impulsiveness was not correlated with either

delay discounting ($r = .14$, $p = $ ns) or the BART ($r = -.07$, $p = $ ns), and the BART was not correlated with delay discounting ($r = .17$, $p = $ ns). Additionally, there were no post-treatment relationships among the behavioral and self-reported personality measures, namely self-reported impulsiveness was not related to delay discounting ($r = .11$, $p = $ ns) or the BART ($r = .09$, $p = $ ns). As with pre-treatment, BART score did not correlate with delay discounting ($r = -.13$, $p = $ ns).

Results Specific to Aim 1: Within-Group Comparisons of Affect- and Personality Indicators at Pre- and Post- Treatment for the Pre-Post Group

To examine the extent to which significant scores across affect and personality domains decreased from pre- to post-treatment specific to Aim 1, paired t-tests were used. Further, effect size statistics are reported to describe the magnitude of the significant change scores from pre- to post-treatment (Cohen & Cohen, 1983). Results indicated a significant decrease on BART score from pre ($M = 41.7$, $SD = 11.8$) to post-treatment, [$M = 32.8$, $SD = 13.6$, $t[34] = 3.55$, $p < .01$, $\eta_p^2 = .30$). However, no significant changes were found for delay discounting ($t[34] = 0.70$, $p = $ ns) or impulsiveness ($t[34] = 0.80$, $p = $ ns). Further examining pre-post changes for group 1 on affective-related measures, significant differences were found for stress reactivity from pre ($M = 36.1$, $SD = 12.2$) to post-treatment, ($M = 30.2$, $SD = 11.2$, $t[34] = 2.32$, $p = .05$, $\eta_p^2 = .16$); and depressive symptoms from pre ($M = 24.1$, $SD = 9.1$) to post-treatment, ($M = 17.2$, $SD = 10.4$, $t[34] = 3.90$, $p < .01$, $\eta_p^2 = .34$). For experiential avoidance ($t[34] = -0.48$, $p = $ ns), state ($t[34] = 0.40$, $p = $ ns) and trait anxiety ($t(34) = -0.83$, $p = $ ns), positive ($t[34] = -1.16$, $p = $ ns) and negative affect ($t(34) = -0.30$, $p = $ ns), and emotion regulation difficulties

(t[34] = 0.40, p = ns), no significant differences were found. Findings suggest a general change (decrease) on BART scores, stress reactivity, and depression symptoms from pre- to post-treatment, which is consistent with Aim 1 (see Table 2). All variables were plotted to observe for non-linear relationships.

Results Specific to Aim 2: Between-Group Comparisons of Sample Characteristics and Substance Use at Pre-Treatment

A between-group comparison analysis was conducted to determine the extent to which sample characteristics and substance use between the pre-post group and post-only group were significantly different from each other at pre-treatment. Two significant differences emerged with respect to referral source and opioid use between groups. Specifically, individuals assigned to the post only group were more likely to have been court mandated, χ^2(1) = 11.6, p < .001, than to have been referred by a different source, including private agency, self-referral, church, and other. Furthermore, opioid use differed between the pre-post group (25.8%) and the post-only group (42.4%), χ^2(1) = 5.62, p < .05. Comparisons also indicated that individuals assigned to the pre-post group and post-only group were not significantly different from each other demographic characteristics, including age (t[63] = 0.37, p = ns), gender [χ^2(1) = 0.46, p = ns], marital status [χ^2(1) = 0.77, p = ns], total household income [χ^2(1) = 1.34, p = ns], employment status [χ^2(1) = 0.79, p = ns], and education [χ^2(3) = .53, p = .05]. For alcohol, marijuana, crack/cocaine, PCP, as well as the other drugs assessed, no significant differences were found. Please refer to Table 1 for additional information. When controlling for

differences with respect to referral source and opioid use between the pre-post group and post-only, the changes across variables in Aim 1 remained significant.

Next, to address the influence of practice effects due to repeated administration of the measures, one-way between-groups analysis of variance (ANOVAs) were conducted to compare post-treatment scores between the pre-post group and post-only (see Table 4). There was a significant difference between the pre-post group ($M = 37.1$) and post-only ($M = 41.2$) on delay discounting scores at post-treatment, [$F(1,49) = 7.55, p < .05, \eta_p^2 = .12$], suggesting the possibility of practice effects for this measure. All other study variables did not indicate a significant difference at post treatment between groups. Specifically, no significant differences were found on BART scores between the pre-post group ($M = 32.8, SD = 13.6$) and post-only ($M = 33.9, SD = 11.8$), [$F(1,48) = 0.05, p = $ ns, $\eta_p^2 = .01$], depressive symptoms [$F(1,49) = 0.03, p = $ ns, $\eta = .01$], and stress reactivity [$F(1,49) = 1.07, p = $ ns, $\eta = .03$]. Therefore, in line with Aim 2, it is unlikely that any change in BART scores, depressive symptoms, and stress reactivity within the pre-post group could be attributed to the influence of pre-testing. Results of these analyses are summarized in Table 4 for between-group conditions.

Chapter 5: Discussion

Substance abuse treatment outcome studies have shown positive effects for a large number of drug users with regard to reduction in substance use, criminal activity, and improvement of general well-being (Wallace, 2001). Affect- (e.g., depressive and anxiety symptoms) and disinhibition–related variables (e.g., impulsivity, risk taking) are related to the development and maintenance of substance use, and these variables

distinguish between substance users with and without Axis I and II disorders that may interfere with treatment success, such as depression, anxiety disorders, or antisocial personality disorder (Guydish, 1999). Nevertheless, there is a dearth of research focused on understanding the extent to which these variables are affected by standard substance use treatments, and more specifically, the extent to which they may change throughout the course of substance use treatment. Towards this end, the current study examined the extent to which relevant affect- and personality-related variables change during the course of 30-day residential substance abuse treatment. Specifically, we examined the degree to which scores on affect (i.e., depression symptoms, anxiety, stress reactivity, and negative affect) and personality-related constructs (i.e., risk taking, impulsiveness, and delay discounting) would change during substance abuse treatment in a sample of 41 adults. An additional sample of 40 adults was tested at 30 days to assess practice effects and to be used as a control where pre-post differences were found.

Risk taking as indexed by participants' BART scores significantly decreased from pre- to post-treatment. However, there was no significant pre-post change on other disinhibition variables of impulsiveness and delay discounting. Depressive symptoms significantly decreased from pre- to post-treatment. Results also indicated a significant decrease on pre-post scores of stress reactivity. Measures of experiential avoidance, state and trait anxiety, negative affect, and emotional regulation difficulties did not significantly change from pre- to post treatment. Moreover, data from the post-test only group suggests that the decrease across each measure was not simply due to the influence of pre-testing.

Influence of Standard Residential Substance Abuse Treatment on Affect and Personality

Indicators

It is important to disentangle possible reasons why study variables might have been influenced by participation in residential substance abuse treatment over the course of treatment. Because the current investigation occurred in the context of a community-based treatment program it did not afford the opportunity to randomly assign participants to different treatment modalities nor include a control group. Therefore, it is difficult to discern precisely which components of standard treatment may have evoked change on our study variables. Several explanations are offered that elucidate potential reasons changes were observed for each variable.

Risk Taking. First and foremost, before considering the possibilities to explain the pre-post changes on BART scores, it is worthwhile to rule-out the chance that pre-testing resulted in the observed reduction in BART scores. Specifically, research conducted by Lejuez and colleagues (2004, 2005) have found BART scores to increase rather than decrease over repeated administration of the task, which is indicative of changes being influenced by practice. Given that participant scores decreased from pre- to post-treatment, and were virtually identical to scores of the post-only group, changes on BART scores are likely to be a result of treatment gains. It may very well suggest that the BART is a useful tool for assessing and capturing risk taking as a change mechanism during treatment among inner-city substance abusers. Pre-post changes may, in fact, reflect the fact that participants' propensity for risk taking decreased over the course of treatment.

Moreover, it is also possible that brain functions changed as a result of treatment. Or, it is also possible that less drug toxicity led to decreased BART scores from pre- to post-treatment (i.e., substance use influenced brain function and the removal of substances influenced BART scores). Researchers at the Yale University School of Medicine's Division of Substance Abuse have begun to utilize magnetic resonance imaging (MRI) scans as a way to examine brain function and brain changes during the course of substance abuse treatment (with the BART task being used in the protocol; Carroll, Potenza, & Rounsaville, in press). Specifically, the prefrontal cortical area of the brain (responsible for risk taking behaviors and impulsivity) may be altered during the course of treatment. These types of investigations will aid in our understanding of the intersection between brain functions and changes on risk taking at the biological level. Such studies also will help to better understand exactly how treatment changes brain function and differentiate between treatment influenced changes versus changes due to the removal of drug use.

Pre-post changes on the BART may have resulted from increased sustained attention on the task. Although participants are given a semi-random ordering of balloons, the task can be considered quite repetitive. Some may argue that patients were more risky at pre-treatment and as a result paid less attention to the task, and during the course of abstinence individuals gained improvement on sustained attention which may have accounted for some of the changes on BART scores. It is noteworthy that in one of the few studies exploring sustained attention, Gillen and colleagues (2001) found that over 25% of admission to an inpatient substance abuse treatment program could be classified as cognitively impaired on the basis of sustained attention.

Finally, risk taking might have been modulated through program structure and accountability in the program. For example, individuals in the treatment program must adhere to strict guidelines that prohibits the use of any drugs (the center requires complete abstinence from drugs and alcohol, and any use is grounds for dismissal). Therefore, patients are made aware of the potential immediate negative consequences of their behavior. In addition to maintaining decisional-balance, patients also may become less risky on the BART by virtue of having scheduled activities as well as a formal structure for each day. Specifically, patients in the treatment program are accustomed to participating in didactic lectures and sessions within a full day, seven days a week. Therefore, these findings may be a function of the change in the environment and structure which, in turn, decreased risky behavior due to the interruption in the association between substance use and the drug-using environment. Thus, by providing patients with an environment where one can focus exclusively on behavior change may have been reason alone for the reported decrease on BART scores.

Depression Symptoms. The current data supporting the impact of substance abuse treatment on depressive symptoms is consistent with the extant literature. Specifically, Guydish et al., (1998) found post-treatment depressive symptoms to decrease by more than 50% after a 1 month course of substance abuse treatment and remained at this level throughout a 6 month follow-up period. Pre-post changes on depressive symptom scores might be attributed to the normal course of depression. Perhaps because depressive symptoms are thought to be cyclical with periods of waxing and waning may be reason enough to demonstrate change on depression symptoms. It might be that substance abusers become more self-aware of their depressed mood and rather than use drugs as a

means to deal with such disposition, they have learned healthy and adaptive ways to cope with depressive symptoms.

Depressive symptoms may have decreased as a result of patients engaging in group activities, which can be thought of as a step in behavioral activation. That is, group activities: 1) increase positive reinforcement; 2) increase social support; and 3) decrease substance use involvement (cf., Lejuez, 2004). In one way, substance use increases isolation, which then serves to increase depressive symptoms. Alternatively, involvement in group activities decreases isolation, which may result in a decrease in depressive symptoms. Therefore, by making these changes it stands to reason that depressive symptom scores would decrease during the course of treatment.

Finally, pre-post changes on depressive symptom scores may be due to the effects of the treatment, which incorporated a multimodal approach to substance abuse, including functional analysis, Alcoholics Anonymous (AA), Narcotics Anonymous (NA), and relapse prevention. Each specific component of these treatments might aid in reducing depression symptoms, including involvement in group meetings that encourage self-efficacy, participation in rewarding activities, and/or having the support of peers throughout the treatment process, which can be difficult to find for patients seeking to reduce substance use.

Stress Reactivity. Germane to the current sample, African Americans, in comparison to other racial/ethnic groups, are at higher risk for developing physical conditions as a result of stress reactions (e.g., hypertension, stroke, and cardiovascular disease; Schneider et al., 2001). There is substantial evidence that stress reactions can be a result of ongoing life circumstances, including economic hardship, lack of control of

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life circumstances, and social instability (Meyers, 2002). Thus, economically disadvantaged minorities are among the groups judged to be at greater risk for stress reactions (Healthy People 2000, p.215). First, lack of employment, substance-filled neighborhoods, coupled with housing difficulties, may have contributed to the heightened stress reaction of these patients at baseline. Therefore, pre-post decreases on stress reactivity scores may be a function of simple removal from their largely impoverished environments. Recent data from divergent sources suggest that individuals with low income tend to be exposed to significant stressful events than other groups and are required to cope with stress reactions for longer periods of time (Chambless & Williams, 1995; Meyers et al., 2002; Schneider et al., 2001). For this reason, changes may have been enhanced by especially elevated levels of stress reactivity at baseline.

It is plausible that scores on stress reactivity decreased as a result of the components of residential treatment that focus on providing educational services (e.g., GED courses), employment skills (e.g., job training, placement interviews), and transitional housing arrangements throughout treatment. Patients may have demonstrated lower stress reactivity at the post-test on account of the fact that treatment addressed patients' adverse life circumstances and provided them with tools to enhance their well-being. Moreover, the stable, safe, and supportive nature of residential treatment may have facilitated change in the participants, given that many were homeless, earned less than $10,000 each year, or lived in neighborhoods pervasively affected by substance abuse. Residential programs potentially offer all of these benefits in one coherent package that removes individuals from their substance-abusing environment and provides them with a supportive place to achieve abstinence.

Given the high rates of co-morbidity between stress and depression in the current study as well as in the extant literature, it may be the case that as stress levels decreased, so did levels of depression (and vice versa). This sets the stage for future investigations, as researchers could examine interactions between variables that may fit within a larger model of change in treatment.

Treatments Components. Given that risk tasking, depression, and stress reactivity evidenced change as a function of participation in treatment, it is important to elucidate how the residential program influenced the study variables. The primary goal of the current residential treatment program is for substance abusers to master skills that will help to maintain abstinence from alcohol and other drugs. Several treatment approaches are utilized in this setting, including functional analysis, standard community-based treatment, and 12-step facilitation (NA/AA). Each of these treatments is described as well as their influence on significant change indicators.

One critical component of the residential treatment program that may have influenced risk-taking, stress reactivity, and depression is the functional analysis. Patients are asked to identify thoughts, feelings, behaviors, consequences, and circumstances before and after the drug use. The functional analysis plays a critical role in helping patients assess the determinants, or high-risk situations, that are likely to lead to substance use which provides insight into some of the reasons why an individual may be using substances (e.g., to cope with interpersonal difficulties, to experiences risk or euphoria not otherwise available in the patient's life). Additionally, patients are encouraged to unlearn old habits and learn or relearn healthier skills and habits. Strategies from the functional analysis are made as broad as possible. For example, skills are

applied to difficulty coping (e.g., social isolation, unemployment). Substance abusers in the program are taught these skills as both specific strategies (applicable in the here and now) and general strategies that can be applied to a variety of other problems.

Furthermore, patients undergo standard community-based treatment that also may have led to a decrease on the study variables. Typical components of this treatment include (1) social and recreational counseling, (2) employment counseling, (3) drug refusal training, (4) anger management, and (5) relaxation training. Similar to the standard community-based treatment, 12-step facilitation (TSF) is grounded in the concept that drug and alcoholism is a disease that can be controlled but never cured. In AA and NA, substance abusers are asked to commit to the program. Participants also are actively encouraged maintain journals of their AA/NA attendance and participation. The major change agent in the disease-model approaches is involvement with the fellowship of AA/NA and working the 12 steps. That is, the way to cope with nearly all drug- and affect-related problems is by attending meetings or deepening involvement with fellowship activities.

Variables Not Influenced by Standard Residential Substance Abuse Treatment

Both risk taking and delay discounting have been conceptualized in the literature as related constructs of disinhibition (Aklin et al., 2005; Lejuez et al., 2004). However, the fact that BART score evidenced a pre-post change during treatment and not delay discounting is somewhat surprising. Admittedly, little available data bears upon an explanation as to why risk taking shared little to no relation with delay discounting, though several arguments could be made. A possible reason for this lack of change may

be due to other nonspecific factors that often figure prominently in substance abuse (Stewart, 1999). Such relevant factors include, but are not limited to, functional impairments related to certain disorders (e.g., Axis I and II disorders and other co-occurring conditions) or one's perception of control and/or one's ability to employ self-regulative skills. Perhaps the lack of a strong association between BART score and delay discounting as well as the lack of change for the latter may be a result of different methodology (i.e., paper and pencil vs. actual behavioral assessment) and not that these variables measure different constructs. Available studies indicate that participants' responses on paper and pencil tasks and observable behavior are often discrepant (e.g., Mitchell, 1999). Conceivably, both tasks differ markedly from each other in the ways in which risk taking is captured. For delay discounting, individuals are given a choice between a smaller immediate reward (i.e., risky choice) over a larger delayed reward (non-risky choice). For example, participants were asked to select from one of two choices; specifically, would you rather have $69 today or $85 in 91 days? Thus, riskiness is conceptualized as "bad" and the participant must learn this association and behave accordingly.

In contrast, risk taking on the BART is conceptualized on a continuum in which riskiness is problematic only after a certain point, with that point varying on a case by case basis. Specifically, participants are told to inflate a computerized balloon that would pop between 1 and 128 pumps and the overall best strategy is to pump 64 times on average for each balloon. Thus, the probability that the balloon exploded on the first pump was 1/128. If the balloon did not explode after the first pump, the probability that the balloon exploded was then 1/127 on the second pump, 1/126 on the third pump and so

on up until the 128th pump at which the probability of an explosion will be 1/1 (i.e.,

100%). In either case, one plausible argument supporting the lack of relation between

these tasks is based on the idea that each measure may tap dissociable aspects of risk

taking which may not be as likely to change.

Also contrary to expectation, several affect-related measures showed no

significant pre-post change. Specifically, no significant differences were identified

among anxiety (both state and trait level) and experiential avoidance scores, nor was

there support for the hypothesis that patients with increased baseline levels of negative

affect would report a decrease in their negative affect at post treatment. These

nonsignificant findings are somewhat surprising given that highly anxious substance

abusers have a tendency to report psychiatric symptoms associated with negative

emotional responding (e.g., depression; Lillienfeld, 2001; Taylor, Koch, Woody, &

McLean, 2006). As one example, it is generally recognized in the literature that substance

abusers have a poor tolerance for anxiety states and negative affect that results from their

ongoing substance use patterns and cycles of withdrawal (e.g., Litt et al., 2000).

Consequently, the absence of change from pre- to post-treatment on anxiety scores may

be driven by patients who attenuate these symptoms largely because of fear of their own

responses to anxiety, which negatively reinforces substance use and thus makes it more

difficult to change compared to other indicators. Therefore, scores on anxiety are seen

following targeted relearning of maladaptive behaviors and are less amenable to change

as a result of non-specific factors during treatment. For example, there are specific

treatments for different anxiety disorders (OCD, Social Phobia, Generalized Anxiety, and

PTSD), and simply sharing thoughts and feelings in a group setting may not translate into

changes on anxiety scores. In comparing baseline levels of state and trait anxiety to other samples, mean anxiety scores for the present sample were over two standard deviations above those for non-clinical men, and over one standard deviation for clinically anxious patients, including patients diagnosed with PTSD and panic disorder (Peterson & Reiss, 2002).

With regard to experiential avoidance, substance abuse provides a convenient and rapid means to mitigate, or otherwise *avoid*, unpleasant negative affect, including physical symptoms and negative thoughts. Therefore, it may be the case that the absence of change was due, in part, to the fact that experiential avoidance represents a learned and entrenched way of dealing with emotions. In order to observe change, longer-term interventions targeting experiential avoidance may be needed. Together, this lack of change across experiential avoidance and state and trait anxiety scores might stem from the fact that African American male substance abusers within urban environments may have an overall higher level of avoidance and anxious disposition, which make it difficult to produce any statistically significant change. As for emotion regulation, participant's scores at baseline were in the non-clinical range which may be indicative of lower general emotion regulatory skills (see Gratz & Roemer, 2004).

Limitations

Before discussing the strengths and potential implications of these findings, it is important to acknowledge the limitations of such a preliminary study. First, the main shortcoming of this study is the relatively small number of subjects in the two groups. This small number of subjects limits the conclusions that can be drawn from

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nonsignificant results, due to the possibility of type II error. In addition, the present sample is limited in the sense that it is comprised of a group of substance abusers who participated in the study for monetary reward. To rule out the possibility that the present results are related to a self-selection bias, it will be important for researchers to utilize recruitment strategies other than those related to monetary reward.

Conclusions that can be drawn also are limited by our reliance primarily on self-report measures. Several drawbacks with relying on self-report measures are especially pronounced in this sample (e.g., Campbell & Stanley, 1963; Ladouceur et al., 2000). Specifically, both the effects of chronic substance use and the low level of education among the sample suggests a potential lack of insight or cognitive ability to understand questions or provide an accurate report of behavior which might have influenced participants' responses. Despite these potential barriers, the self report measures demonstrated moderate to high internal consistencies and also were correlated with each other, suggesting that the self report constructs may have been assessed reliably. Likewise, it is unclear as to whether many of the self-report measures are culturally sensitive and appropriately applied to the thoughts, feelings, and behaviors of inner city African Americans (Lowe, 2006). Behavioral measures, on the other hand, compliment self-report measures and address these limitations in that they rely less on subjective responses and more on actual behavior (i.e., multi-trait, multi-method framework; Griffin et al., 2003). Perhaps because behavioral tasks simulate situations under which real-world risk behaviors may occur (e.g., Bickel, Odum, & Madden, 1999; Crean, de Wit, & Richards, 2000; Mitchell, 1999; Vuchinich & Simpson, 1998). Furthermore, behavioral assessments emphasize observable behavior with choices and consequences akin to the

"real-world." Future studies would benefit from multiple behavioral and self-report measures for each construct.

One major limitation of the current findings is the broader concept of not having included a comparison group. Therefore, we cannot differentiate the extent to which individuals might have improved or changed without treatment. The question could be answered by including a no-treatment control group in the future experimental design. As a way to improve the current methodological design which included a pre-post and post only group, the next step would be to include a no-treatment design that would directly control for threats to internal validity. A no-treatment control also will help to better explain why individuals might have changed on the study variables.

Participants were not assessed at follow-up, which makes it difficult to demonstrate the extent to which change in subjects across treatment is linked to treatment success or other aspects of substance abuse. For example, it is unclear as to whether changes in treatment persist following treatment. The issues raised can only truly be addressed through scientifically rigorous experimental procedures that include a follow-up component. Although follow-up data beyond one month would be valuable in ascertaining the long-range stability of our findings, this study represents a first step of a larger research program. Thus, future research would likely yield information about the mechanisms of action from which clinical researchers can derive the most efficacious and effective treatments on a patient-to-patient basis.

Another limitation involves the fact that the current study included a homogeneous sample of inner-city, male, African American substance abusers. Accordingly, there needs to be some caution before making generalizations to other

samples. Researchers often consider inner-city substance abusers together, but as pointed out by Kelder et al. (2003), important ethnic/racial differences exists in prevalence rates, and more importantly, substance use disproportionately impacts African Americans who incur increased relative risk of mortality from diseases associated with substance use, including HIV infection (USDHHS, 2003). While not necessarily generalizable to all samples of inner-city substance abusers, the current study provides valuable data on a group whose affect and personality characteristics might allow for the development of unique treatment opportunities. Future studies should expand these methods to more diverse samples to examine the scope and generalizability of these change mechanisms of treatment among other substance abusing groups. These findings, if truly robust, should hold across samples and study populations, particularly in residential treatment settings where risk taking, depressive symptoms and increased levels of stress are often the rule, not the exception. Taken as a whole, this study is limited by its preliminary nature.

Strengths of the Current Study and Future Directions

     Despite the above limitations, there are several strengths of the current study as well as future directions in this line of research. The current methodological design made it possible to examine pre-post changes while controlling for practice effects, which is a major asset of this study. In this way, we obtained more stringent estimates of the magnitude of change across affect- and personality-related variables than would analyses without these statistical controls. As expected, the present data support the hypothesis that changes on affect and personality measures over the course of treatment were not due to the influence of pre-testing. Specifically, BART scores were not significantly different

between Group 1 and Group 2 at post-treatment. As found with affect-related variables,

post-treatment scores on depression and stress reactivity across both groups were

virtually identical and thus were not influenced by practice effects. Naturally, these data

will need to be extended to processes in the context of a follow-up design where

predictors can be used to examine changes throughout treatment and the extent to which

these changes persist. As with all research that utilizes repeated assessments, it is

important to acknowledge the possibility of practice effects. Even though practice effects

did not influence the findings, a future study will benefit from utilizing a complete

Solomon's four-group design to more thoroughly control for the effects of pre-testing

(i.e., pretest sensitization; Kazdin, 2003). Essentially, to fully address this potential

methodological issue, a minimum of four groups is required. These four groups in the

design are the two groups, where one group receives treatment and the other does not,

plus another two groups of post-test only. To illustrate the design, the sequence of events

in the design (e.g., treatment, control) for each group will be presented symbolically

using the following notation: *R* stands for random assignment of subjects to conditions;

Pr for pre-treatment assessment; *Tx* for the treatment; and *Po* for post-treatment

assessment. The Solomon four-group design can be diagrammed as follows:

R	*Pr*	*Tx*	*Po*
R	*Pr*		*Po*
R		*Tx*	*Po*
R			*Po*
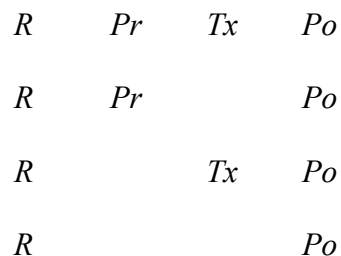
The current study also has the potential to build on the effectiveness of already

existing residential programs. However, in order for this to be possible, future studies

need to replicate and extend these findings. For example, it would be necessary to investigate whether one specific model is better than another within residential settings (Cognitive Behavioral Therapy vs. 12-step or relapse prevention). Essentially, would these various treatment models have more or less change on risk taking, depressive symptomatology, and stress reactivity? Along these same lines, another area of development would be to explore the extent to which changes on these indicators persist across each treatment modality. Each respective question provides the opportunity to develop research that expands beyond the current study.

The mechanisms responsible for changes on BART score, depressive symptomatology, and stress reactivity remain unclear. Therefore, future studies must test theories that might explain changes on these variables during residential treatment. Bandura's social-cognitive model appears to provide a theoretical framework that is consistent with this line of research. For example, this model posits how change of behaviors depends on an interaction among one's environment and one's personal characteristics. Specifically, the facilitation of change is centered on having the behavioral means, resources, and social support under which individuals develop a sense of control or perceived self-efficacy. Thus, in guiding one's behavior, self-regulative skills, including *affective* reactions to one's own conduct are important constructs to consider. Such skills will determine the potential situations in which an individual may find the necessary skills to resist social pressures and engagement in substance use that ultimately will lead to behavior change.

Treatment Modification and Development Implications

With respect to the clinical relevance and the extent to which these findings may be generalizable, it is important to understand the extent to which changes occur in more standard substance use treatments and why specifically this treatment. This is one of the first empirical investigations to examine the changeability of disinhibition in general, but more specifically exploring changes on affect variables as well with an underserved population. It is conceptually useful to know that theoretically-relevant personality variables are susceptible to change for the purpose of improving existing treatment and enhancing substance abuse programs. Although these data cannot be directly translated into a treatment per se, it does provide paths for future research which seeks to isolate specific treatment components of existing interventions that differentially reduces risk taking, depressive symptomatology, and stress reactivity for inner-city substance abusers. Therefore, these data set the stage for studies to not only describe changes in treatment, but also to highlight the mechanisms responsible for these changes and differentiate which indicators might be expected to change on their own with abstinence (occurring naturally vs. through formal treatment), and/or by removal from a drug-involved, impoverished, or criminal environment. Essentially, the logical step is to explore whether changes are due to the type of treatment or simply abstinence.

Conclusions and Recommendations

This study is the first in a promising line of research demonstrating that standard residential treatment can impact variables that are known contributors to substance use (i.e., risk taking propensity, depression symptoms, and stress reactivity). More

compellingly, our results remained significant even after controlling for the potential bias

of repeated administration of the measures. Each of the domains that demonstrated a

decrease as a result of treatment taps theoretically and practically relevant predispositions

that may offer additional information related to substance abuse treatment. Furthermore,

such information could potentially lead to enhanced discrimination of effective treatment

strategies across various levels of substance abuse severity by identifying salient

variables for intervention.

Given the ability for risk taking and affect-related variables to change, larger scale

investigations need to elucidate the mediating and moderating emotion- and disinhibition-

based variables which might influence levels of change. For example, future research is

necessary to determine which variables moderate the relation between stress reactivity

and depression scores across pre-post change. Investigations of this nature could

potentially uncover self-regulatory mechanisms and coping skills that replace decisions to

self-medicate, leading ultimately to pathway models of substance abuse that may offer

researchers and clinicians credible information to guide their interventions. Furthermore,

these findings highlight the importance of the use of behavioral tasks to allow researchers

to collect more precise, time- and context-specific results. In an effort to inform treatment

modification and enhancement, depending on the level of change across these variables,

individuals could be targeted to receive treatment modules developed to address these

specific behaviors. Thus, a future step of this study would be to assess how changes

across these variables predict treatment completion and long-term abstinence. A related

question is whether changes on disinhibition variables are sustained after treatment

completion. What are the key variables responsible for producing change on targeted

affect and personality related variables? Treatment development studies should aim to supplement treatment modules that include both personality and environmental factors. These findings, along with related studies, may eventually provide the theoretical framework for treatment studies that can target these factors and explore the development, treatment and prevention of substance abuse disorders. This study was an important first step in this process, as it contributed to our understanding of the mechanisms of change characteristics of residential substance abuse treatment.

Table 1. Means, standard deviations, and baseline comparisons of pre-post and post only, as well as percentages of individuals acknowledging any use, weekly use, or polysubstance use

	Pre-post (*n*=41)[a] M (SD)	Post only (*n*=40)[b] M (SD)	Statistic ([a/b])
Age	38.0 (10.3)	41.0 (9.0)	$t(63) = 0.37$, p = ns
Gender (% Male)	83.3%	85.8%	$\chi^2(1) = 0.46$, p = ns
Total Household Income	$21,200 (22,400)	$20,300 (25,200)	$\chi^2(1) = 1.34$, p = ns
Ethnicity (% African American)	94.8%	95.0%	$\chi^2(1) = 0.84$, p = ns
Marital/Relationship Status (% Single)	72.9%	69.7%	$\chi^2(1) = 0.77$, p = ns
Employment Status (% Unemployed)	81.7%	78.8%	$\chi^2(1) = 0.79$, p = ns
Education Level			$\chi^2(3) = .53$, p = .05
None	2.1%	9.1%	
Some High School	29.2%	30.3%	
High School Graduate/GED	37.5%	36.3%	
Some College/ College Graduate	10.4%	12.1%	
Referral Source			
Court Ordered	68.8%	97.0%	$\chi^2(1) = 11.6$, p = .001
Acknowledging Any Use			
Alcohol	72.4%	81.8%	
Marijuana	70.8%	75.8%	
Stimulants (other than cocaine)	14.6%	12.1%	
Crack/Cocaine	58.3%	63.6%	
Opiates	25.8%	42.4%	
Hallucinogens (other	28.1%	37.5%	

	Pre-post (*n*=41)[a] *M* (SD)	Post only (*n*=40)[b] *M* (SD)	Statistic ([a/b])
than PCP)			
PCP	47.9%	57.6%	
Sedatives	16.7%	24.2%	
Inhalants	08.3%	18.2%	
Polysubstance Use	54.3%	63.6	
Acknowledging Weekly Use			
Alcohol	20.8%	27.1%	
Marijuana	20.8%	35.4%	
Stimulants (other than cocaine)	08.3%	47.9%	
Crack/Cocaine	37.5%	39.4%	
Opiates	18.8%	06.3%	
Hallucinogens (other than PCP)	04.2%	16.7%	
PCP	08.3%	06.3%	
Sedatives	04.2%	14.6%	
Inhalants	02.1%	04.2%	
Polysubstance Use	26.7%	35.4%	

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Table 2. Change in relationships across variables from pre-post treatment.

	Pre [*M(SD)*]	Post [*M(SD)*]	Statistic, p value
1. Experiential Avoidance	96.0 (9.7)	96.1 (9.0)	*t*(34) = -0.48, *p* = ns
2. State Anxiety	89.9 (10.8)	89.9 (9.9)	*t*(34) = 0.40, *p* = ns
3. Trait Anxiety	51.8 (4.6)	52.7 (3.7)	*t*(34) = -0.83, *p* = ns
4. Depressive Symptomatology	24.1 (9.1)	17.2 (10.4)	*t*(34) = 3.90, *p* < .01
5. Positive Affect	49.4 (9.6)	50.7 (9.3)	*t*(34) = -1.16, *p* = ns
6. Negative Affect	30.1 (5.7)	30.9 (5.3)	*t*(34) = -0.30, *p* = ns
7. Delay Discounting	37.3 (7.8)	37.1 (7.8)	*t*(34) = 0.70, *p* = ns
8. Stress Reactivity	36.1 (12.2)	30.2 (11.2)	*t*(34) = 2.32, *p* = 05
9. Emotion Regulation	77.6 (22.3)	75.1 (24.1)	*t*(34) = 0.40, *p* = ns
10. Impulsiveness	09.3 (4.5)	08.8 (4.2)	*t*(34) = 0.80, *p* = ns
11. BART	41.7 (11.8)	32.8 (13.6)	*t*(34) = 3.55, *p* < .01

Table 3. Internal consistencies (α) and intercorrelations among baseline demographics, behavioral and self-reported affect and personality measures at pre- and post-treatment.

	α	1 Pre/Post	2 Pre/Post	3 Pre/Post	4 Pre/Post	5 Pre/Post	6 Pre/Post	7 Pre/Post	8 Pre/Post	9 Pre/Post	10 Pre/Post
Self-report measures											
1. Experiential Avoidance	.74	--	-.02 / .29*	.56** / -.20	.59** / -.10	.06 / .26	.13 / .03	.37* / .01	.60** / -.06	.48** / -.17	-.22 / .06
2. State Anxiety	.69		--	-.09 / -.12	-.13 / .23	.46** / .58**	.23 / .05	.31 / .34*	.10 / .23	.15 / .12	.11 / .09
3. Trait Anxiety	.60			--	.31* / -.02	.20 / .19	-.02 / .27	.20 / .21	.16 / .07	.06 / .12	-.13 / .24
4. Depressive Symptomatology	.76				--	.01 / .05	.41** / .39*	.38* / .56**	.53** / .69**	.42** / .43**	.10 / .06
5. Positive Affect	.70					--	-.19 / -.15	.01 / .20	-.23 / .01	.09 / .07	.01 / .02
6. Negative Affect	.71						--	-.04 / -.15	-.29 / -.11	-.05 / -.15	.25 / .28
7. Stress Reactivity	.89							--	.63** / .68**	.38* / .33*	-.13 / .12
8. Emotion Regulation	.80								--	.69** / .54**	-.35* / .14
9. Impulsiveness	.72									--	-.07 / .09
Behavioral tasks											
10. BART	--										--
11. Delay Discounting	.94										
Demographics											

Note: BART indicates the average number of pumps on balloon task, excluding balloons that exploded; * indicates $p < .05$; ** indicates $p < .01$.

Table 4. Change scores on affect and personality-related variables at post-treatment between the pre-post and post-only group to assess for the influence of practice effects.

Measure	Pre-Post Group [a]Post *M (SD)*	Post-Only [b]Post *M (SD)*	Statistic ([a/b])
Experiential Avoidance	96.1 (9.1)	93.4 (9.8)	$F(1,49) = 0.88$, p = ns
State Anxiety	89.9 (9.9)	92.6 (17.3)	$F(1,49) = 1.07$, p = ns
Trait Anxiety	52.7 (3.7)	49.7 (8.3)	$F(1,49) = 0.62$, p = ns
Depressive Symptomatology	17.2 (10.4)	17.3 (11.4)	$F(1,49) = 0.03$, p = ns
Positive Affect	50.7 (9.4)	51.9 (5.5)	$F(1,49) = 0.01$, p = ns
Negative Affect	30.9 (5.3)	29.3 (8.1)	$F(1,49) = 1.05$, p = ns
Delay Discounting	37.1 (7.8)	41.3 (6.3)	$F(1,49) = 7.55$, $p < .05$
Stress Reactivity	30.2 (11.2)	32.7 (8.5)	$F(1,49) = 1.07$, p = ns
Emotion Regulation	75.1 (24.1)	75.8 (26.5)	$F(1,49) = 1.77$, p = ns
Impulsiveness	8.8 (4.3)	8.7 (6.1)	$F(1,49) = 0.35$, p = ns
BART score	32.8 (13.6)	33.9 (11.8)	$F(1,48) = 0.05$, p = ns

Appendix A: Substance Abuse Treatment Settings

Almost without exception, private and government funded methadone maintenance, outpatient, and residential substance abuse treatment programs are frontline approaches to promote recovery from substance abuse. Methadone maintenance treatments provide a form of medium-term, abstinence-oriented substitution treatment. A basic feature of methadone treatment is that the drug is prescribed on a constant-dose in order to stabilize the patient's functioning while at this same time decrease their urges to use heroin. Whereas outpatient treatment programs usually consist of one to two evenings a week of group treatment. Partial hospitalization and day treatment programs are a form of outpatient treatment that require patients to reside in a treatment facility during the day, participating in the daily treatment regiment and then return home for the evening and overnight. Finally, before admission into residential treatment patients generally participate in a detoxification program lasting from 7 to 21 days. Following this initial phase, patients attend structured daily activities designed to facilitate recovery, usually lasting between 1 to 6 months.

Appendix B: Residential Treatment Approaches

The mainstay of residential treatment incorporates a multimodal approach to substance abuse, including 12-step and/or relapse prevention. The 12-step model is evident in such programs as Alcoholics Anonymous, as well as peer support and governance (i.e., Narcotics Anonymous), all of which are directed towards recovery through abstinence. The overarching theme of this model is that addiction is a disease which is based on an underlying physical dependency and physiological predisposition, and the patient does not have control over his or her own behavior. This approach also emphasizes the role of spirituality in the recovery process. The effectiveness of substance abuse programs utilizing 12-step programs has been criticized for lacking sound methodologies (Ouimette, Finney, & Moos, 1997; Tonigan et al., 1996).

Another common approach utilized in substance abuse treatment programs is relapse prevention (Marlatt & Gordon, 1985). This self-management approach is based on social learning theory (Bandura, 1977), and combines behavioral skills training, cognitive interventions, and overall lifestyle change procedures. The tenets involved in this treatment are referred to as cognitive behavior therapy (CBT). Specifically, the goal is to teach patients who are attempting to change over learned behavioral patterns how to anticipate and cope with relapse as well as challenge maladaptive thoughts and feelings that may interfere with this behavioral change. A major component of the relapse prevention model is the identification of high-risk situations (i.e., triggers) through self-monitoring, self-efficacy ratings, and detailed analysis of past relapse episodes (Wilson, 1992). Thus, the aim is to elucidate the factors that might lead to relapse and to increase

the patient's awareness of the operation of these factors (Messina, Wish, & Nemes, 2000).

The empirical support for relapse prevention in substance abuse treatment has been generally encouraging. In a study comparing relapse prevention to interpersonal treatment in a residential setting, Ito, Donovan, and Hall (1988) found no between-treatment differences on substance use, but did uncover differential effects on other post treatment measures including self-efficacy, impulsivity, and behavioral coping. In a similar study that comprised individuals with substance use dependency participating in behavior therapy, individuals receiving additional relapse prevention used significantly less substances in general, followed regime more reliably (i.e., taking disulfiram [Antabuse] on time), and reported better social relationships than individuals without the additional treatment (O'Farrell et al., 1998). Furthermore, a number of recent studies have investigated the efficacy of relapse prevention for cocaine-dependent individuals. In a study that randomly assigned cocaine-dependent patients to different treatment, McKay and colleagues (1997) compared relapse prevention to treatment as usual. Treatment as usual produced greater abstinence than individualized relapse prevention, while relapse prevention more effectively reduced cocaine use in those who had difficulty in achieving abstinence during and after treatment. In a study of delivery modality (i.e., individual vs. group therapy), Graham et al., (1996) found that the way in which relapse prevention was provided had no effect on drug and alcohol outcomes.

Brown, Seraganian, Tremblay, and Annis (2002) evaluated matching substance use patient attributes to varying treatments. A total of 154 patients were randomized into two experimental groups. Seventy-two patients were randomly assigned to the 12-step

group and 61 patients were assigned to the relapse prevention group; 21 patients refused randomization and thus, were not included in the final analyses. The 12-step program consisted of 10 sessions and focused on the disease concept to achieving sobriety. Sessions were structured following a standard protocol each week, which including symptom review, discussion of program involvement, introduction and review of each session. This module was compared to a relapse prevention program (Marlatt, 1985) that involved 10 weekly sessions. During the initial counseling phase, an individualized treatment plan was developed for each patient, which identified the specific triggers, patterns of substance use, and consequences. All patients were matched on the following variables: age, gender, substance abuse profile, and psychological status. At the 6-month follow-up, four significant findings emerged. First, females with a multiple substance abuse profile reported better substance use outcomes with 12-step than their relapse prevention counterparts. Additionally, relapse prevention was found to maintain abstinence significantly longer for patients reporting low distress compared to patients with high distress. Of note, better outcomes were obtained when random assignment to treatment was consistent with the patient's preference. The authors suggest that the 12-step approach may provide the most favorable substance use outcomes for most groups of substance users. However, they also indicate that relapse prevention may be most suitable for patients with low psychological distress.

Appendix C: Weekly Therapy Schedule for Salvation Army Patients

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Functional Analysis / Positive Conflict Resolution	Relapse Prevention	Relapse Prevention	Relapse Prevention	Relapse Prevention	Recreational Therapy	Bible Study
Community Management	Stress Management	HIV Education	Anger Management	Parenting	Cultural Diversity	Prayer
Chemical Dependency	Drug Classification	Chemical Dependency	Criminal Thinking	Self-Esteem	News and Discussion	Worship
NA/AA	NA/AA	NA/AA	NA/AA	NA/AA	NA/AA	

Appendix D: Demographic Information

Age: ____

Gender: Female: ____ (0)   Male: ____ (1)

Marital/Relationship Status:
____ (1) Single (never married, living alone, divorced, widowed, etc)
____ (2) Living with a partner as if married
____ (3) Married <u>but</u> separated
____ (4) Married

Ethnicity/Race:
____ (1) Black/African American   ____ (4) Asian
____ (2) White/Caucasian   ____ (5) Native American
____ (3) Hispanic/Latino   ____ (6) Other: _____

Total Family/Household Income: please check one
____ $0 – 9,999   ____ $40,000 - $49,999   ____ $80,000 - $89,999
____ $10,000 – 19,999   ____ $50,000 - $59,999   ____ $90,000 - $99,999
____ $20,000 – 29,999   ____ $60,000 - $69,999   ____ $100,000 or more
____ $30,000 – 39,999   ____ $70,000 - $79,999

Employment Status:
____ (1) Unemployed
____ (2) Employed part-time (working 1 – 30 hours a week)
____ (3) Employed full-time (working more than 30 hours a week)
____ (4) Home maker
Occupation: _____

What is your referral source? _____

Before entering the Salvation Army Harbor Lights Residential Center, what was your primary drug of choice? _____

Have you ever been diagnosed with a psychiatric disorder? 'Yes' or 'No'
        If yes, which one(s): _____

Are you currently taking any medications? 'Yes' or 'No'
        If yes, which ones: _____ Medication   _____ Dosage

Appendix E: AAQ

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following scale to make your choice.

1-----------2---------------3---------4--------------5--------------6---------------7
Never   very seldom   seldom   sometimes   frequently   almost always   always
true   true   true   true   true   true   true

_____1.   I am able to take action on a problem even if I don't know the right thing to do.

_____2.   When I feel depressed or anxious, I am unable to take care of my responsibilities.

_____3.   I try to stop thoughts and feelings that I don't like by just not thinking about them.

_____4.   It's OK to feel depressed or anxious.

_____5.   I rarely worry about getting my anxieties, worries, and feelings under control.

_____6.   In order for me to do something important, I must have all my doubts worked out.

_____7.   I'm not afraid of my feelings.

_____8.   I try hard to avoid feeling depressed or anxious.

_____9.   Anxiety is bad.

_____10.   Despite doubts, I feel as though I can set a course in my life and then stick to it.

_____11.   If I could magically remove all the painful experiences I've had in my life, I would do so.

_____12.   I am in control of my life.

_____13.   If I get bored of a task, I can still complete it.

_____14.   Worries can get in the way of my success.

_____15.   I should act according to my feelings at the time.

_____16.	If I promised to do something, I'll do it, even if I later don't feel like it.

_____17.	I often catch myself daydreaming about things I've done and what I would do differently next time.

1-----------2---------------3---------4-------------5--------------6--------------7
Never very seldom seldom sometimes frequently almost always always
true   true   true   true   true   true   true

_____18.   When I evaluate something negatively, I usually recognize that this is just
                a reaction, not a solid fact.

_____19.   When I compare myself to other people, it seems that most of them are
                handling their lives better than I do.

_____ 20.   It's not necessary for me to learn to control my feelings in order to handle
                my life well.

_____ 21.   A person who is really "together" should not struggle with things the way
I do

_____ 22.   There are not many activities that I stop doing when I am feeling
                depressed or anxious.

Appendix F: STAI - S

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right* now, that is, *at this moment.* There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	1	2	3	4
22. I feel nervous and restless	1	2	3	4
23. I feel satisfied with myself	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I feel like a failure	1	2	3	4
26. I feel rested	1	2	3	4
27. I am "calm, cool and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that doesn't really matter	1	2	3	4
30. I am happy	1	2	3	4
31. I have disturbing thoughts	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I make decisions easily	1	2	3	4
35. I feel inadequate	1	2	3	4
36. I am content	1	2	3	4
37. some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Appendix G: CES-D

Below are questions about how you have felt in the **PAST WEEK**. For each question, please answer how often you have felt this way in the **PAST WEEK**.

For each question:
0 = Rarely or none of the time (less than one day)
1 = Some ore little of the time (1-2 days)
2 = Occasionally or a moderate amount of time (3-4 days)
3 = Most of the time (5-7 days)

Please circle ONE number for each question.

During the PAST WEEK:	Rarely or none of the time	Some or a little of the time	Occasionally or a moderate amount of the time	Most of the time
1 I was bothered by things that usually don't bother me.	0	1	2	3
2 I did not feel like eating my appetite was poor.	0	1	2	3
3 I felt that I could not shake off the blues even with the help from my family or friends.	0	1	2	3
4 I felt that I was just as good as other people.	0	1	2	3
5 I had trouble keeping my mind on what I was doing.	0	1	2	3
6 I felt depressed.	0	1	2	3
7 I felt that everything I did was an effort.	0	1	2	3
8 I felt hopeful about the future.	0	1	2	3
9 I thought my life had been a failure.	0	1	2	3
10 I felt fearful.	0	1	2	3
11 My sleep was restless.	0	1	2	3

12	I was happy.	0	1	2	3

During the PAST WEEK:	Rarely or none of the time	Some or a little of the time	Occasionally or a moderate amount of the time	Most of the time
13 I talked less than usual.	0	1	2	3
14 I felt lonely.	0	1	2	3
15 People were unfriendly.	0	1	2	3
16 I enjoyed life.	0	1	2	3
17 I had crying spells.	0	1	2	3
18 I felt sad.	0	1	2	3
19 I felt that people disliked me.	0	1	2	3
20 I could not get going.	0	1	2	3
21 I was a lot less interested in most things.	0	1	2	3
22 I was unable to do the things I used to enjoy.	0	1	2	3

Appendix H: PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and mark the appropriate answer in the space next to that word. Indicate to what extent you FEEL THIS WAY RIGHT NOW.

	Slightly/Not at all	A little	Moderately	Quite a bit	Extremely
1. Interested	1	2	3	4	5
2. Distressed	1	2	3	4	5
3. Excited	1	2	3	4	5
4. Upset	1	2	3	4	5
5. Strong	1	2	3	4	5
6. Guilty	1	2	3	4	5
7. Scared	1	2	3	4	5
8. Hostile	1	2	3	4	5
9. Enthusiastic	1	2	3	4	5
10. Proud	1	2	3	4	5
11. Irritable	1	2	3	4	5
12. Alert	1	2	3	4	5
13. Ashamed	1	2	3	4	5
14. Inspired	1	2	3	4	5
15. Nervous	1	2	3	4	5
16. Determined	1	2	3	4	5
17. Attentive	1	2	3	4	5
18. Jittery	1	2	3	4	5
19. Active	1	2	3	4	5
20. Afraid	1	2	3	4	5

Appendix I: Money Choice Questionnaire

For each of the next 27 choices, please circle which one you would prefer if given the choice between the two: would you rather have the smaller reward today, or wait the specified number of days and take the larger reward? Please answer EVERY question.

Please take the choices seriously: they may be for REAL MONEY. If you have any questions regarding this, please ask.

1. Which would you rather have?
   a. $49 today   b. $60 in 89 days
2. Which would you rather have?
   a. $47 today   b. $50 in 160 days
3. Which would you rather have?
   a. $54 today   b. $80 in 30 days
4. Which would you rather have?
   a. $27 today   b. $50 in 21 days
5. Which would you rather have?
   a. $41 today   b. $75 in 20 days
6. Which would you rather have?
   a. $55 today   b. $75 in 61 days
7. Which would you rather have?
   a. $34 today   b. $35 in 186 days
8. Which would you rather have?
   a. $34 today   b. $50 in 30 days
9. Which would you rather have?
   a. $22 today   b. $25 in 136 days
10. Which would you rather have?
    a. $80 today   b. $85 in 157 days
11. Which would you rather have?
    a. $14 today   b. $25 in 19 days
12. Which would you rather have?
    a. $19 today   b. $25 in 53 days
13. Which would you rather have?
    a. $15 today   b. $35 in 13 days
14. Which would you rather have?
    a. $25 today   b. $30 in 80 days
15. Which would you rather have?
    a. $33 today   b. $80 in 14 days
16. Which would you rather have?
    a. $54 today   b. $55 in 117 days
17. Which would you rather have?
    a. $54 today   b. $60 in 111 days
18. Which would you rather have?
    a. $11 today   b. $30 in 7 days

19. Which would you rather have?
      a. $69 today   b. $85 in 91 days

20. Which would you rather have?
      a. $78 today   b. $80 in 162 days

21. Which would you rather have?
      a. $20 today   b. $55 in 7 days

22. Which would you rather have?
      a. $31 today   b. $85 in 7 days

23. Which would you rather have?
      a. $24 today   b. $35 in 29 days

24. Which would you rather have?
      a. $40 today   b. $55 in 62 days

25. Which would you rather have?
      a. $67 today   b. $75 in 119 days

26. Which would you rather have?
      a. $28 today   b. $30 in 179 days

27. Which would you rather have?
      a. $25 today   b. $60 in 14 days

Appendix J: Drug Use Questionnaire

The following questions will ask whether you have used certain types of drugs. Please circle the number that indicates whether you have used these drugs (1=yes) or not (0=no).

		Yes (1)	No (0)
1.	Have you ever used cannabis (for example, hash, marijuana, THC, or other)?	1	0
2.	Have you ever used alcohol?	1	0
3.	Have you ever used cocaine (for example, intranasal, IV, crack, freebase, "speedball," or other)?	1	0
4.	Have you ever used MDMA (also known as Ecstasy, E, and X)?	1	0
5.	Have you ever used stimulants that were <u>not</u> prescribed for you by a doctor (for example, amphetamine, "speed," crystal meth, dexadrine, Ritalin, "ice")?	1	0
6.	Have you ever used sedatives, hypnotics, or anxiolytics that were not prescribed for you by a doctor (for example, Xanax, Quaaludes, Valium, Librium, barbiturates, Miltown, Ativan, Dalmane, Halcion, Restoril, Seconal, or other)?	1	0
7.	Have you ever used opiates that were not prescribed for you by a doctor (for example, heroin, morphine, opium, Methadone, codeine, Demerol, Darvon, Perdocan, Dilaudid, or other)?	1	0
8.	Have you ever used hallucinogens other than PCP (for example, LSD, mescaline, peyote, psilocybin, STP, mushrooms, "angel dust," or other)?	1	0
9.	Have you ever used PCP?	1	0
10.	Have you ever used inhalants (for example, glue, gasoline, paint, nitrous oxide, "laughing gas," or other)?	1	0
11.	Have you ever used nicotine (for example, cigarettes, dip, chew, cigar, or other)?	1	0

Please circle the answer that is correct for you.

	Never	One Time	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
1a. About how often did you use cannabis (i.e., marijuana) *in the past year*?	0	1	2	3	4	5
1b. *During the period in your life when you were using cannabis/marijuana most frequently*, about how often were you using?	0	1	2	3	4	5
2a. About how often did you use alcohol *in the past year*?	0	1	2	3	4	5
2b. *During the period in your life when you were using alcohol most frequently*, about how often were you using?	0	1	2	3	4	5
3a. About how often did you use cocaine *in the past year*?	0	1	2	3	4	5
3b. *During the period in your life when you were using cocaine most frequently*, about how often were you using?	0	1	2	3	4	5
4a. About how often did you use ecstasy *in the past year*?	0	1	2	3	4	5
4b. *During the period in your life when you were using ecstasy most frequently*, about how often were you using?	0	1	2	3	4	5
5a. About how often did you	0	1	2	3	4	5

use stimulants *in the past year*?

	One Time	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week	Never
5b. *During the period in your life when you were using stimulants most frequently*, about how often were you using?	0	1	2	3	4	5
6a. About how often did you use sedatives *in the past year*?	0	1	2	3	4	5
6b. *During the period in your life when you were using sedatives most frequently*, about how often were you using?	0	1	2	3	4	5
7a. About how often did you use heroin *in the past year*?	0	1	2	3	4	5
7b. *During the period in your life when you were using heroin most frequently*, about how often were you using?	0	1	2	3	4	5
8a. About how often did you use hallucinogens *in the past year*?	0	1	2	3	4	5
8b. *During the period in your life when you were using hallucinogens most frequently*, about how often were you using?	0	1	2	3	4	5
9a. About how often did you use PCP *in the past year*?	0	1	2	3	4	5
9b. *During the period in your*	0	1	2	3	4	5

life when you were using PCP most frequently, about how often were you using?

10a. About how often did you use inhalants *in the past year*?	0	1	2	3	4	5
10b. *During the period in your life when you were using inhalants most frequently*, about how often were you using?	0	1	2	3	4	5
11a. About how often did you use nicotine *in the past year*?	0	1	2	3	4	5
11b. *During the period in your life when you were using nicotine most frequently*, about how often were you using?	0	1	2	3	4	5

1.   How often *during the past year* have you found that you were not able to stop using drugs once you had started?

Never   Less than Monthly   Monthly   Weekly   Daily or almost daily
(0)   (1)   (2)   (3)   (4)

2.   How often *during the past year* have you failed to do what was normally expected from you because of your drug use?

Never   Less than Monthly   Monthly   Weekly   Daily or almost daily (0)
                (1)   (2)   (3)   (4)

3.   How often *during the past year* have you had a feeling of guilt or remorse after using drugs?

Never   Less than Monthly   Monthly   Weekly   Daily or almost daily (0)
                (1)   (2)   (3)   (4)

4.   How often *during the past year* have you been unable to remember what happened the night before because you had been using drugs?

Never   Less than Monthly   Monthly   Weekly   Daily or almost daily (0)
                (1)   (2)   (3)   (4)

5.   How often *during the past year* have you used drugs to keep yourself from experiencing withdrawal symptoms?

Never   Less than Monthly   Monthly   Weekly   Daily or almost daily (0)
                (1)   (2)   (3)   (4)

6.   Have you or someone else been injured as a result of your drug use?

  No   Yes, but <u>not</u> in the past year   Yes, in the past year
 (0)   (1)   (2)

7.   Has a relative or friend, or a doctor or other health worker been concerned about your drug use or suggested you cut down or stop?

  No   Yes, but <u>not</u> in the past year   Yes, in the past year
 (0)   (1)   (2)

Appendix K: I-7

Instructions: Please answer each question by putting a circle around the 'YES' or the 'NO' following the questions. There are no right or wrong answers, and no trick questions. Work quickly and do not think too long about the exact meaning of the question.

1. Do you often buy things on impulse?   YES   NO

2. Do you generally do and say things without stopping to think?   YES   NO

3. Do you often get in a jam because you do things without thinking? YES   NO

4. Are you an impulsive person?   YES   NO

5. Do you usually think carefully before doing anything?   YES   NO

6. Do you often do things at the spur of the moment?   YES   NO

7. Do you mostly speak without thinking this out?   YES   NO

8. Do you often get involved in things you later
    wish you could get out of?   YES   NO

9. Do you get so 'carried away' by new and exciting ideas
    that you never think of possible snags?   YES   NO

10. Do you need to use a lot of self-control to keep out of trouble?   YES   NO

11. Would you agree that almost everything enjoyable is
    illegal or immoral?   YES   NO

12. Are you often surprised at people's reactions to what you do or say? YES   NO

13. Do you think an evening out is more successful if it is unplanned
    or arranged at the last moment?   YES   NO

14. Do you usually work quickly, without bothering to check?   YES   NO

15. Do you often change your interests?   YES   NO

16. Before making up your mind, do you consider all the
    advantages and disadvantages?   YES   NO

17. Do you prefer to "sleep on it" before making decisions?   YES   NO

18. When people shout at you, do you shout back?   YES   NO

19. Do you usually make up your mind quickly?   YES   NO

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