

ABSTRACT

Title: DISTRESS TOLERANCE TREATMENT FOR
INNER-CITY DRUG USERS: A
PRELIMINARY TRIAL

Marina Alexa Bornovalova, Ph.D., 2008

Directed By: Carl W. Lejuez, Associate Professor, Department
of Psychology

Despite advances in preventing treatment failure, a large percentage of substance-using individuals drop out of treatment. Current work indicates that one's threshold for tolerating psychological distress (i.e., distress tolerance) is a key factor in treatment dropout. Following from this work, we developed a treatment for prevention of treatment drop-out in a residential treatment setting. Specifically 66 individuals who were a) receiving residential substance use treatment and b) evidenced deficits in distress tolerance at a baseline assessment were assigned to receive either the novel treatment (Skills for Improving Distress Intolerance, SIDI), supportive counseling (SC) treatment, or no-treatment control (NTC). We hypothesized that compared to individuals in the SC and NTC, individuals in the SIDI would show greater improvements in levels of distress tolerance, greater improvement on measures theoretically related to distress tolerance (i.e., levels of negative affect, disengagement coping, emotion regulation, self-efficacy in high-risk situations, and self-efficacy of mood regulation), and higher rates of treatment

completion. Results indicated that those in SIDI evidenced greater improvement in distress tolerance, compared to SC and NTC. However, there were no significant differences in improvement in the secondary measures, except for affect regulation self-efficacy (approaching significance). It should be noted, however, that the percentage of individuals reaching clinically significant improvement showed that more individuals in SIDI, compared to SC and NTC, reached such improvement. Comparison of 30-day treatment completion showed that there were no dropouts in either SIDI or SC; all dropouts occurred in NTC. When considering dropout throughout the entire residential treatment contract (ranging from 30 to 180 days), the least dropouts occurred in SIDI, followed by SC and NTC (in this order); however, this difference was not significant. The current results suggest that SIDI is effective in increasing distress tolerance in inner-city drug users. Additionally, the variable rates of dropout that were, nevertheless, nonsignificant suggest a need for larger-scale studies to test the effect of SIDI on dropout.

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PRELIMINARY TRIAL.

By

Marina Alexa Bornovalova

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Advisory Committee:

Professor Carl W. Lejuez, Professor, Chair

Jack Blanchard, Professor

Ty Tashiro, Professor

Andrea Chronis, Associate Professor

Suzanne Randolph, Professor, Dean's Representative

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Chapter 1: Introduction

A great deal of research in the past two decades has focused on the development and evaluation of effective treatments for substance users. Although treatment does indeed lead to continued abstinence for a number of patients (Gossop, Marsden, Stewart, & Treacy, 2002; Hubbard et al., 1997), evidence indicates that a large percentage of individuals entering treatment for drug abuse leave treatment prematurely (e.g., Godley et al., 2002, Hubbard et al., 1997; Lash et al., 2001, Ravndal & Vaglum, 2002; Simpson, Joe, & Brown, 1999), with recent large-scale studies indicating dropout rates of approximately 50% (SAMHSA, 2002). Thus, the early stages of treatment are a time when patients are especially vulnerable to dropping out, and this is especially concerning since early treatment failure deprives addicted individuals of the opportunity to practice and implement drug-free patterns of thought and behavior.

One group for whom the concern of treatment dropout is quite relevant is illicit drug users undergoing residential treatment. Individuals participating in residential treatment programs are faced with a number of difficulties including very structured environments, a lack of privacy, and daily structure that often greatly contrasts with their typical lifestyle outside of treatment (for a description of residential treatment, please see appendix B). Thus, not only are these individuals experiencing withdrawal symptoms and drug cravings, they also are adapting to a new demanding and restrictive environment. In turn, these adjustments can produce unpleasant and uncomfortable emotions (e.g., anger, frustration, depression, and guilt). Such emotional distress could therefore be considered an inherent emotional consequence of the initial stages of treatment, and leaving the

restrictive environment (prematurely) and turning to drug or alcohol use temporarily ameliorates this discomfort.

Thus, to understand the processes underlying early substance use treatment failure, researchers have identified several, albeit inconsistent correlates of treatment completion and dropout, including demographics (Maglione, Chao, & Anglin, 2000), psychiatric symptoms and Axis I and II psychopathology (Greenberg, Otero, & Villanueva, 1994; Hattenschwiler, Ruesch, & Modestin, 2001; Linehan et al, 1999; Martinez-Raga et al, 2002), drug use severity (Ravndal & Vaglum, 1991), treatment motivation (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003; Hutchison, 1996; Simpson, Joe, & Rowan-Szal, 1997), drug court status (Collins & Allison, 1983; Lawental, McLellan, & Grissom, 1996), and therapeutic alliance (Horvath & Symonds, 1991; Martin et al, 2000; but see Alterman et al, 1996; Agosti, Nunes, Stewart, & Quitkin, 1991; Claus, Kindleberger, & Dugan, 2002; McFarlain, Cohen, Yoder, & Guidry, 1977; Nemes, Wish, & Messina, 1999 for contradictory findings)¹; however these findings do not explain *why* an individual would choose to drop out of treatment. As such, the most conservative interpretation is that these constructs alone do not fully account for all of the processes involved in a patient's decision to leave treatment.

The Role of Experiential Avoidance in Substance Use Treatment Failure

Borrowing from work conducted with outpatient samples, negative mood states (Baker et al., 2004; Correia et al., 2002; Hall et al., 1991; McCusker, Stoddard, Frost, & Zorn, 1996) and the presence of interpersonal and environmental stressors (Ames & Roitzsch, 2000; Dobkin, De Civita, Paraherakis, & Gill, 2002) may be important

¹ Please see Appendix A for a review of the relationship between these covariates and treatment dropout.

variables to consider as potential predictors of treatment dropout. However, similar to the variables mentioned above, these latter factors do not appear to capture fully the mechanisms involved in one's attempt to persist through the difficult early stages of treatment (el-Guebaly, Hodgins, & Armstrong, 1999). Research focusing on relapse (rather than treatment completion) has suggested that the surges in negative affect occurring a few hours before a lapse (i.e., an initial episode of drug or alcohol use after a period of abstinence) may be the most predictive of relapse (i.e., the act of resuming extensive substance use, usually at a level equal to or greater than the previous amount; Shiffman & Waters, 2004). As such, it may be one's inability to persist through intense negative affect that is the most relevant to relapse, and, extending this model to the current work, to treatment dropout. Stated otherwise, it is not simply affective distress that relates to treatment outcomes, but how one responds to affective distress and related withdrawal that may be critical in determining one's ability to persist through the difficult first stages of treatment.

The account of one's response to affective distress as a key variable in treatment failure has the considerable virtue of aligning this line of research with the larger literature focusing on emotional or experiential avoidance, a construct defined as a chronic unwillingness to remain in contact with emotional distress and related efforts to avoid this distress (see Hayes et al., 1996; 1999; Salters-Pedneault et al., 2004). To this end, there is evidence that efforts to cope directed at modifying or avoiding troublesome internal states are problematic. For example, emotion-focused and avoidant strategies have been found to negatively predict outcome for a variety of difficulties, including substance abuse (Ireland, McMahon, Malow, & Kouzekanani, 1994; Kruegelbach,

McCormick, Schulz, & Grueneich, 1993), depression (DeGenova, Patton, & Jurich, 1994; Bruder-Mattson & Hovanitz, 1990), and sequelae of child sexual abuse (Leitenberg, Greenwald, & Cado, 1992). Further, current theory and empirical research suggests that attempts to avoid internal experiences have paradoxical effects, increasing the frequency, severity, and accessibility of these experiences (Clark, Ball, & Pape, 1991; Clark, Winton, & Thynn, 1993; Hayes et al., 1996; 1999; Lavy & van den Hout, 1990; Roemer & Borkovec, 1994; Salters-Pedneault et al., 2004; Wegner & Erber, 1992; Wegner, Erber & Zanakos, 1993; Wegner, Schneider, Carter, & White, 1987). For instance, Wegner et al (1987) examined the interaction between instructions to suppress thoughts and thought frequency and found that deliberate attempts to suppress target thoughts increased the occurrence of these thoughts. Further, Lavy and van den Hout (1990) as well as Merkelbach and colleagues (1991) have described (and provided empirical data for) the notion of “initial enhancement” – an immediate increase in thought frequency when suppression is attempted. Similarly, Clark and colleagues (1991, 1993) have found that efforts to suppress succeed in the short term but result in a “rebound effect,” i.e., an increase in frequency above baseline levels when active suppression ceases. Such rebound effects have a number of clinical implications, and suggest the value of considering avoidance of affective distress in treatment dropout.

Distress Tolerance as a Predictor of Early Treatment Failure

Although the research described earlier provides suggestive evidence that treatment dropout may be associated with an unwillingness to remain in contact with distressing internal experiences, a limitation of this research is its reliance on self-report measures, with little work utilizing behavioral or experimental assessments. To address this

limitation, an emerging line of research has focused on the experimental assessment of *distress tolerance*, or the willingness to tolerate intense negative affect without resorting to impulsive behaviors (Brown, Lejuez, Kahler, and Strong, 2002; Daughters, Lejuez, Kahler, Strong, & Brown, 2003; Daughters et al, 2005; Linehan, 1993). In brief, the distress tolerance laboratory paradigm consists of asking participants to engage in and persist through a task that gradually increases in difficulty (thereby also increasing emotional distress). The participant has the option to persist (and receive a reward) or, in contrast, to terminate the task, thereby reducing affective distress in the short term but potentially losing out on the reward in the long-term. Conceptually, a distress tolerance laboratory paradigm assesses an unwillingness to remain in contact with distressing affective experience. Thus, the use of such a paradigm within this line of research may provide the opportunity to examine the extent to which treatment dropout is associated with an unwillingness to tolerate distress under real-time conditions.

Several recent studies converge to provide evidence of the utility of distress tolerance paradigms in substance use research. As a first study in this line of research, Quinn, Brandon, and Copeland (1996) compared heavy smokers and non-smokers on two behavioral persistence tasks (i.e., a difficult anagram task and a “mirror-tracing task”, where the subject is to trace a difficult shape while only seeing him/herself in the mirror). Results indicated that nonsmokers evidenced significantly greater distress tolerance than smokers. Further, individuals with substance abuse histories tended to be less persistent than individuals without such histories even after controlling for smoking status, supporting the theory that substance abusers evidence lower levels of distress tolerance than those that do not misuse substances.

Taking the relationship between distress tolerance and smoking a step further, Brown, Lejuez, Kahler, and Strong (2002) theorized that differences in the ability to tolerate distress may influence one's ability to successfully quit smoking, suggesting that smokers who are unable to succeed in a smoking cessation attempt would evidence lower levels of distress tolerance than those who succeed. Current smokers who had failed to sustain any previous quit attempt for more than 24 hours (immediate relapsers) were compared to smokers with at least one sustained quit attempt of three months or longer (delayed relapsers) on measures of both physical and psychological distress tolerance. Relative to delayed relapsers, immediate relapsers were characterized by higher baseline levels of affective distress, greater levels of dysphoria and urge to smoke following 12-hour nicotine deprivation, and lower distress tolerance, suggesting that these may be risk factors for early lapse in the context of quitting smoking. In addition, Brandon et al (2003) tested prospectively whether differences in distress tolerance (i.e., as assessed by persistence on two psychologically distressing tasks: anagrams and mirror-tracing) predicted sustained abstinence in a sample of heavy smokers. Indeed, pre-treatment task persistence on the mirror tracing task predicted sustained abstinence throughout a 12 month follow-up, suggesting a relationship between psychological distress tolerance and abstinence.

Following from these findings in the domain of nicotine dependence, researchers have hypothesized that similar processes should apply to abstinence from alcohol and/or illicit drugs. Thus, in a retrospective investigation, we examined if distress tolerance may be related to past abstinence attempts. Results indicated that persistence on the psychological stressor was positively related to duration of most recent abstinence

attempt, with this effect persisting after controlling for demographics, drug use frequency, and negative affect (Daughters, Lejuez, Kahler, Strong, & Brown, 2003). As a prospective extension of this study, we recently found that distress tolerance predicted 30 day treatment dropout above and beyond relevant self-report predictors of residential substance use treatment dropout, including demographics variables, mood variables, psychopathology, substance use severity, treatment readiness, and social support, supporting the unique role of distress tolerance in one's ability to complete the early stages of treatment (Daughters et al, 2005). Taken together, studies utilizing substance abusing samples suggest that distress tolerance, or the ability to persist in the face of emotional distress, is significantly related to the ability to sustain an abstinence attempt and ability to remain in residential treatment.

Available Treatment Models for the Development of a Distress Tolerance Treatment

If distress tolerance is indeed the mechanism underlying treatment failure, interventions aimed at bettering treatment outcomes should focus on enhancing a patient's ability to persist through emotional discomfort and willingness to experience distress. Acceptance-based behavioral treatments (e.g., Acceptance and Commitment Therapy, ACT; Hayes et al., 1999; Dialectical Behavior Therapy, DBT, Linehan, 1993; also see Marlatt et al, 2004) may be particularly useful in this regard. These treatments stem from the view that many maladaptive behaviors are the result of unhealthy attempts to avoid or suppress thoughts, feelings, or bodily sensations (Hayes, Wilson, Gifford, Follette & Strosahl, 1996; Linehan, 1993), and, thus focus on increasing emotional acceptance. For example, ACT teaches patients to (a) identify and alter internally oriented control strategies, (b) practice willingness with regard to thoughts and feelings,

and (c) focus on overt behaviors that are consistent with valued directions. Similarly, DBT incorporates acceptance-based strategies with traditional change-oriented strategies, emphasizing the importance of both emotional acceptance and mood-independent behavior. Thus, as related to the goals of the current project, acceptance-based interventions may be useful in changing the patient's modal response to a distressing cue from behavioral escape to adaptive coping behavior (e.g., affective distress in itself may become a cue for adaptive coping).

Recent evidence suggests that acceptance-based treatments may be useful in treating substance use disorders, implicating decreased experiential avoidance/enhanced distress tolerance as the mechanism of action. For instance, at least three initial studies (see Gifford, Antonuccio, Kohlenberg & Hayes, 2002; Gifford et al, 2004; Hayes et al, under review) found that ACT (combined with Nicotine Replacement Therapy) was associated with better long-term smoking outcomes at 1-year follow-up than Nicotine Replacement Therapy alone, and that treatment effects were mediated by changes in levels of avoidance and inflexibility. Extending this work to illicit substance users, Hayes et al (2004) compared methadone maintenance alone to methadone maintenance in combination with 16 weeks of either Intensive Twelve-Step Facilitation or ACT in the treatment of opiate dependence. Results indicated that ACT was associated with lower drug use during follow-up than methadone maintenance alone. Similarly, DBT has been applied to substance abusing populations, and has been found to significantly reduce the rates of premature treatment termination (Linehan et al, 1999), and significantly improve the rates of post-treatment abstinence (Linehan et al, 2002) among those with co-occurring borderline personality disorder and substance use disorders. Moreover, DBT

includes a series of interventions specifically focused on increasing distress tolerance through a combination of acceptance and distraction strategies. Together, these results suggest that acceptance-based treatments may indeed be useful in keeping substance users in treatment.

In addressing experiential avoidance/distress intolerance among a group of distress intolerant inner-city substance users, the benefits of acceptance-based approaches may be augmented by the use of experiential- and practice-based treatment strategies (i.e., strategies that include a mood induction paradigm with subsequent application of newly taught skills). Such strategies have root in earlier work on the treatment of substance abuse, in which researchers and clinicians focused on the role of external, contextual cues in triggering drug-use responses (e.g., Drummond & Glautier, 1994; Franken et al., 1999; Litman et al., 1990; O'Brien et al., 1990; Monti et al., 1993; Rohsenow & Monti, 1999; Powell et al., 1993). Although exposure treatments based on these approaches have provided encouraging results, more recent research indicates that many of the contextual cues for drug abuse are interoceptive (largely emotional) rather than environmental (Lowman et al., 1996; O'Connell & Martin, 1987; Wikler, 1965). For example, in a retrospective study of opiate abusers, interoceptive cues accounted for the majority of reasons for relapses: 32% of relapses occurred after negative emotional states, 32% after negative physical states not characterized by withdrawal-like symptoms, 16% after withdrawal-like states, and 5% after positive emotional states (Chaney et al., 1982). Likewise, drug craving in the laboratory appears to be enhanced by the induction of negative mood states (Childress et al., 1994; Sherman et al., 1989) as well as naturally-occurring negative moods (Robbins et al., 2000). Although the above literature has

focused on drug use and relapse, this information also suggests that strategies utilizing mood induction paradigms, whereby patients are exposed to negative mood states and then required to practice an adaptive non-avoidant and non-impulsive response, may be especially helpful in reducing the likelihood of treatment dropout.

The focus on experiential- and practice-based treatment strategies is also not surprising given that mood induction strategies have been an integral part of many treatment programs for disorders characterized by avoidance of affective processes (see Barlow, 2002; Orsillo, Roemer, & Barlow, 2003; Schmidt et al., 2000). Beyond emotional disorders, Otto, Safren and colleagues (2004) highlighted that treatments that include a component of mood induction and in-vivo practice have provided encouraging results for various types of drug and alcohol problems (Drummond & Glautier, 1994; Franken, De Haan, van der Meer, Haffmans, & Hendriks, 1999). As a representative study, Pollack and colleagues (2002) tested a novel treatment that attempts to help patients enhance their tolerance of emotional and withdrawal cues for substance use, and respond with more adaptive strategies. Twenty-three treatment-resistant opiate-dependent patients were randomly assigned to either this novel program or a program of increased counseling, with the two treatments comparable in therapist contact, assessment time, and contingency-reinforcement strategies. The experimental (novel) treatment consisted of a 15-session program (12 regular sessions, with 3 booster sessions) that was designed to (1) repeatedly expose patients to the emotional states and somatic sensations that served as cues for drug use, and (2) help patients develop alternative responses to these cues. The goal was to weaken exaggerated emotional responses to craving sensations, and reduce conditioned drug-craving or drug-use responses to the cues. Stated differently, the

treatment focused on the ability of patients to tolerate affect while selecting adaptive (non-drug) alternatives when faced with emotional cues for use. Between-group analysis of changes in addiction severity index scores indicated moderate effect sizes for women and smaller effect sizes for men ($d = .37$ and $d = .13$, respectively) for alcohol use; for opiate use, between-group analyses indicated a medium to large effect size ($d = .61$) among women in particular. These effects reflect a treatment advantage for acceptance + mood induction-based approaches relative to treatment as usual + increased contact time.

Beyond theoretical appeal, experiential-based approaches also hold several practical benefits. First, implicit within these strategies are the components of individualization, immediate behavioral practice, and the replacement of maladaptive coping behaviors with more adaptive responses (Otto, Powers, & Fischmann, 2005). As a second benefit, given that much of behavior change in these type of programs occurs outside of treatment through homework (Craske & Barlow, 2001; Kazantzis & Lampropoulos, 2002), the early stressful stages of residential treatment provide a perfect opportunity to apply self-regulation strategies to the naturally occurring distress and, as a consequence, achieve a sense of mastery. Thus, the distress tolerance treatment that we propose to develop has at its core, the systematic and repeated exposure to negative mood states, during which patients will be allowed to practice strategies that facilitate emotional acceptance (rather than avoidance) and distress tolerance.

One relevant question that needs to be addressed when combining acceptance-based approaches and mood induction-based paradigms is that of the potential theoretical disparity between the two approaches. Indeed, along with the notion of mood induction, traditional therapies (such as prolonged exposure or exposure/response prevention, Foa &

Rothbaum, 1998; Riggs & Foa, 1993) generally require a return to pre-induction mood level. In contrast, in approaches such as ACT, this type of return to baseline/pre-induction mood is not necessary and, in fact, would be considered to have paradoxical effects. Further, on the surface, mood induction/practice-based approaches may seem in line with the traditional/historical model of emotional control. This gap between the two treatments, however, may not preclude their integration, especially if mood induction/practice-based approaches are used to facilitate contact with previously avoided internal experiences, with a focus on coming into contact with (rather than controlling) them. First, one could suggest that coming into contact with previously avoided experiences, and, as such, changing one's relationship to those experiences may be an active ingredient of exposure. That is, the mood induction/behavioral practice component need not emphasize the *control* of emotions, but simply an opportunity to practice experiencing these emotions. As such, it is quite possible to incorporate mood induction exercises into acceptance-based approaches. Second, teaching of emotional modulation as well as helping patients develop alternative responses to previously-avoided cues need not be synonymous with internal control, but instead emphasize psychological flexibility. Indeed, mood induction/practice-based strategies need not be used to eliminate the emotion, but rather to allow for adaptive responses other than escape. Finally, although this would not be the focus of the intervention or goal of the treatment, such skills may ultimately help attenuate the intensity of the emotion by limiting thought or affect suppression and avoidance.

Significance

Individuals in residential treatment for drug misuse are faced with multiple stressful demands, rendering the first stages of sobriety the most difficult to withstand. Thus, it is not surprising that even with good treatment resources, a large percentage of individuals who receive treatment for drug abuse drop out prematurely and relapse soon after. This fact is noteworthy and unfortunate, as individuals who drop out of treatment are also most vulnerable to unremitting substance misuse and its associated morbidity and mortality (Agosti, Nunes, Stewart, & Quitkin, 1991; Stark, 1992). As discussed above, evidence indicates that distress tolerance, or one's ability to withstand psychological distress (including that associated with the first stages of sobriety) is a key factor in treatment dropout. In turn, this suggests that in order to decrease the probability of treatment failure, effective future treatments should aim to increase a patient's level of distress tolerance. Thus, based on current research and theory, we aimed to develop and implement a specialized and novel behavioral distress tolerance treatment, the efficacy of which can be tested in future large-scale randomized clinical trials. Specifically, individuals who were a) receiving residential substance use treatment and b) evidenced deficits in distress tolerance at a baseline assessment session were recruited and assigned to receive either the novel treatment (Skills for Improving Distress Intolerance, SIDI), supportive counseling (SC) comparison treatment, or a no-treatment control group (NTC). We hypothesized that even after accounting for more traditionally studied variables of demographics, psychopathology, addiction severity, motivation for change, and therapeutic alliance, those in the SIDI condition (compared to those in the SC and NTC conditions) would evidence a) significantly greater improvements in levels of distress tolerance, and b) significantly higher rates of treatment completion. As a

secondary aim, we explored the effect of SIDI on several variables theoretically related to distress tolerance, including levels of negative affect, disengagement and avoidance coping, self-efficacy in high-risk situations, and self-efficacy of mood regulation. We hypothesized that compared to SC, those in SIDI would evidence significantly greater improvements in self-efficacy in high-risk situations, and self-efficacy of mood regulation, and significantly greater drops in levels of negative affect, disengagement and avoidance coping. We hoped that this program of research would in the development of a specialized, efficacious program that targets not only improvements in distress tolerance, but a reduction in rates of treatment dropout. Finally, this trial provided the opportunity to develop treatments targeted to an underserved group of predominantly African American, inner city, illicit drug users.

Chapter 2: Research Design and Methods

Overview

Overall Design and Procedure

Participants: Prospective participants were sampled from 90 consecutive admissions in a substance use residential treatment facility in an inner-city area in NE Washington DC. Treatment at this center involves a mix of strategies adopted from Alcoholics and Narcotics Anonymous as well as group sessions focused on relapse prevention and functional analysis. Complete abstinence from drugs and alcohol is required upon entry into the center and through the duration of the program, with the exception of caffeine and nicotine; regular drug testing is provided and any drug or alcohol use results in immediate dismissal from the center. When needed, detoxification from an outside source is required prior to entry into the center. Typical treatment lasts between 30 and 180 days and aside from scheduled activities (e.g., group retreats, physician visits), residents are not permitted to leave the center grounds during treatment.

As shown in Table 1, participants were 66 individuals (M age = 43.5 SD = 9.8; 79.4% male; 90.1% African American), with a mean income of \$23,300 (SD = \$29,900). Approximately one-third (35.8%) of the participants had an education level of “less than high school”, 34.3 % had a “high school or equivalent” level, and 30% had “some college and above” level. Additionally, 77.9% had some prior substance use treatment experience, and 61.8% were court-mandated into the current treatment. Of the 66 participants (see below for inclusion/exclusion criteria), 22 were assigned to SIDI; 19 were assigned to SC, and 25 were assigned to NTC.

Procedure: Participants were recruited into the study no sooner than 48 hours and

no later than five days from entry into the facility. The 48 hour period was aimed at limiting interference of withdrawal symptoms on participation. At the beginning of the session, the participant was given a more detailed explanation of the procedures and asked to provide written informed consent. Given issues of reading comprehension, efforts were made to ensure that participants understood all facets of the consent form and the study itself by reading the consent form verbally and then prompting for questions. Following informed consent, participants completed the screening which included a psychotic screener from the SCID-NP (First, Spitzer, Gibbon, & Williams, 1995) and the two psychological distress tolerance tasks (i.e., PASAT, mirror-tracing task). Each participant was reminded before the task that the better they performed on the task the more money they would earn. At the end of the session, all participants were paid \$10 regardless of performance. Following completion of the challenge tasks, participants were told how much money they have earned, and if they were eligible for the full study. Only participants who were low in distress tolerance (defined as the non-completion of at least one of the two behavioral tasks), were not evidencing acute psychosis, and were somewhat literate were eligible for participation in the treatment protocol.

If potential patients were eligible, they were eligible to continue this testing session on the same day. Specifically, they were asked if they are willing to participate in a treatment that may help reduce their chances of relapse. They were told that they would complete a baseline assessment session that would last another 30 minutes (in addition to the screening session they just completed), followed by 6 therapy sessions over a two week period over their second and third week at the treatment center, and concluding with a final assessment lasting approximately 30 minutes. Interested participants

completed the rest of the SCID-NP as well as a battery of questionnaires to assess demographics, treatment motivation, severity of dependence, social-cognitive factors, and, for the purposes of construct validity, self-report measures of experiential avoidance (see below for a description of measures). The order of measures in each packet was randomized. A proctor was present at all times to provide instruction and answer any questions. Following completion of the baseline session, participants were randomized but with the condition that no more than two people could be in the same condition; in that case, they were randomized to other available conditions. All six therapy sessions were scheduled across weeks 2 and 3 of the participant's stay in the center. In addition to the \$10 for the initial screening, participants were paid \$30 total for participation in therapy and an additional \$10 for the final assessment. Total possible payment was \$50. Of note, out of 68 potential participants who qualified for therapy and follow-ups, only 2 declined participation in SIDI, and one dropped out of SC. Of note, there were no dropouts from SIDI. Of note, procedure for NTC was similar for baseline and post-test. However, no therapy was given. Further, subjects in NTC were paid \$10 for the initial screening and \$10 for the post-test.

A detailed overview of treatment conditions is provided below. The Monday evening following the day of therapy (end of week three to beginning of week four of participants' stay at the residential center), subjects completed the outcome measures (i.e., measures of distress intolerance/experiential avoidance, negative affect, treatment motivation, and social-cognitive variables) and completed the distress tolerance tasks as described above. Once all procedures are completed, participants' retention in treatment

was tracked by contact with the administrative offices of the treatment center. For a summary of assessment schedules, please refer to Table 1 (following page).

Table 1- Schedule of Assessments

Assessment	Pre-screening	Additional Baseline Assessment	Post-Therapy Assessment
Demographic and Clinical			
Demographics Sheet		X	
Treatment History Questionnaire		X	
Medication Sheet		X	
SCID-NP, Psychosis screener	X		
SCID-NP Axis I and Select Axis II/DIPD (Axis II)		X	
DUDUT		X	
ASI/SIP		X	
Potential Covariates:			
Social-Cognitive Predictors			
SOCRATES		X	X
NMRE		X	X
BSCQ		X	X
RWCCL/CBI		X	X
DERS		X	X
Non-Specific Therapeutic Factors			
CALPAS-Brief		X	X
Program Satisfaction		X	X
Main Outcome Variables: Task persistence and emotional avoidance			
Emotional avoidance (AAQ)		X	X
Task persistence (PASAT, Mirror Tracing)	X		X
Treatment integrity/internal validity			
Therapist adherence and Competence			X
Payment:		\$10	\$30 for therapy sessions; \$10 for final assessment

Experimental Design Considerations

Several decisions were made regarding the experimental design and inclusion/exclusion criteria. First, we decided to focus on treatment completion as our main outcome variable, since the current project stemmed directly from prior work suggesting that distress tolerance is a robust predictor of treatment dropout among inner-city drug users. Moreover, individuals who drop-out of treatment are clearly at increased risk for an unremitting course of substance misuse, with often terminal consequences (Agosti, Nunes, Stewart, & Quitkin, 1991; Stark, 1992). Based on the results of the current study, future, larger-scale treatments can replicate the current study and utilize relapse as an outcome variable.

Additionally, we considered whether the comparison treatment for SIDI should be supportive counseling, or instead, a “standard of care” that has already been shown to reduce treatment dropout (e.g., motivational interviewing, voucher-based programs, and role induction, Dunn et al, 2001; Higgins et al. 1994; Stark et al, 1990) in outpatient settings. Several factors indicated that the supportive counseling comparison may be most appropriate for this particular project. First, the notion of comparing SIDI to supportive counseling is consistent with the recommendations of Chambless and Ollendick (1991), and comparable to typical trials in this line of research (e.g., Pollack et al., 2002). Based on the information about the feasibility of this treatment, future, more large-scale studies will include more rigorous comparison conditions. Second, the proposed trial is preliminary, and seeks to determine if SIDI may be better than non-specific therapy factors – such as therapeutic alliance and contact time – each of which have been shown to be effective in reducing dropout in and of themselves (Horvath & Symonds, 1991;

Craig, 1985). Finally, the targeted mechanism of action (experiential avoidance) is highly different from mechanisms or processes targeted in other effective retention strategies (with the majority ultimately attempting to target motivation and therapeutic alliance); as such, these process variables will be controlled for, but the comparison with such retention strategies is reserved for larger-scale studies that are perhaps attempting to determine the “active ingredients” of each treatment. As mentioned above, validation, frequent therapist contact, and therapeutic alliance are considered active factors in reducing treatment drop-out in their own right; as such, we also included a no-treatment control group (NTC) in order to understand the relative contribution to improvement in distress tolerance and treatment retention across skills training and therapeutic factors.

Fourth, it was necessary to determine how many sessions would be adequate to achieve an improvement in one’s ability to persist through emotional discomfort (and consequently, to persist through early stages of treatment). We decided that six sessions of treatment may be optimal for several reasons. First, six sessions of treatment can be completed by the participant’s third week in the center [data from Daughters et al (2005) suggests that 78% of dropouts happen within the third and fourth week of treatment], thus providing distress tolerance skills during or even before they will be most useful. Relatedly, the current number of sessions is both cost- and labor-effective as well as reasonable in terms of future implementation into a larger treatment framework (e.g., as an adjunct to inpatient treatment); conversely, a larger number of sessions may conflict with the already intense schedule at residential facilities. Finally, a recent review of existing substance abuse interventions has recommended that brief treatments may be especially efficacious for retaining clients in treatment and enhancing treatment

participation (DHHS, 1999).

Fifth, we considered testing for the mediational role of change in distress tolerance between treatment condition and treatment dropout. We decided against this analysis for several reasons. First, the current study aims to provide pilot data to examine if this path of investigation is worthy of follow-up in future, larger studies. As a related concern, the *N* in the current study is necessarily small, due to the scope of the project. Given that the rates of dropout in the center are rather low, a mediational analysis would provide ambiguous results. That is, it would not be clear whether a lack of mediation (if there would be such a lack) or its presence is due to a true effect or the small sample size. As such, we decided to test three of the four requirements of mediation (see below; also see Baron and Kenny, 1986), without the fourth and last step that would actually establish mediation. Evidence for individual steps of mediation would provide some data to indicate whether this is a path worth pursuing in the future.

A sixth consideration was whether to include or exclude individuals with Axis I disorders and/or use of psychotropic medications. Due to the high rate of Axis I comorbidity in drug dependence (cf. Ziedonis et al., 1994), it was clear that including such individuals would maximize external validity (Rounsaville, Weiss, & Carroll, 1999), and in contrast, excluding individuals with Axis I comorbidity would greatly limit our sample. Further, Humphreys and Weisner (2000) demonstrated that African Americans, low-income individuals, and individuals who have more severe alcohol, drug, and psychiatric problems are disproportionately excluded under most criteria. Thus, given that the majority of our sample consisted of low income African Americans presenting with some type of psychiatric comorbidity, excluding individuals based upon psychiatric

co-morbidity would have weakened the generalizability of the results. Thus, we elected to include co-morbid conditions (with the exception of acute psychosis), and individuals taking psychotropic medications, but included several self-report and interview measures of psychopathology (see Measures section), and examined the differences in rates of these variables across the three treatment groups to determine if they should be used as covariates in subsequent analyses.

Finally, we considered if repeated assessments of distress intolerance and experiential avoidance (as well as other relevant factors) should be used throughout treatment. We decided on assessments pre- and post-therapy only for three reasons. First, we were concerned about scores decreasing as simply a function of repeated assessment rather than the effect of treatment itself. Relatedly, we were concerned about the sensitivity (or lack thereof) of the instruments to detect session-to-session changes. Finally, subject fatigue as well as the amount of time required to complete a testing session was an issue; that is, individuals from the current sample of inner-city drug users displaying low distress tolerance were likely to become easily frustrated, which in turn could have lead to distortions of responding such as “Christmas-treeing” the questionnaires.

Overview of Treatment

Approximately one-third of the eligible subjects received an individual treatment focused on improving distress tolerance (and by inference, preventing treatment dropout). Treatment was delivered in six sessions over a 3-week period and was delivered by Ms. Bornovalova. Supervision was provided by Dr. Gratz. Therapist manuals were used at all times to ensure standardization of treatment delivery. Ms. Bornovalova was given

feedback on her adherence during each supervision session. Each of the treatment sessions lasted approximately 1.5 hours. A brief description of the components of the treatment (across each session) is presented below.

Skills for Improving Distress Intolerance (SIDI)

The treatment protocol consisted of strategies drawn from Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), as well as DBT (Linehan, 1993) and practice-based/mood induction strategies (as described by Otto et al, 2004 and Zvolensky, Lejuez, Kahler, & Brown, 2003). Specifically, participants were asked to generate a number of highly distressing situations that they had encountered in the past week (focusing on the emotions of sadness, shame/guilt, fear, and anger). The therapist then conducted the mood induction procedure with the patient (in-session and utilizing the previously-learned skills). After the mood induction procedure, the therapist ensured that the client engaged in the practice of the newly taught skill for 20 minutes per session (for details on how a therapist ensured skill acquisition/engagement in the new skill, see below). Further, after the mood induction procedures, participants periodically rated their level of distress on the subjective units of distress scale (SUDS, 0-100). If needed, at the end of the session, the therapist walked a client through progressive muscle relaxation procedures to ensure that the client's mood has returned to at least a half-point from the beginning of the procedures (for ethical reasons, and to minimize potential maladaptive behavior post-session). Session I was focused on the treatment rationale and building a therapeutic alliance. All practice-based/mood induction work was conducted in sessions 2-6, such that learning a new skill was alternated with a mood induction exercise within a given session. After each session, the client was asked to practice a particular

skill whenever possible, using the analogy that a particular skill taught in session is a “hammer”, and every situation until the next session is a “nail”.

Session 1.

Overview of Treatment Goals and Rationale. Participants were given the rationale for combined acceptance-based/exposure treatment, emphasizing the utility of approaching previously avoided internal experiences.

Antecedent-Emotion-Behavior-Consequence model. Therapist helped participants identify that internal experiences (i.e., feelings and physiological sensations) lead to maladaptive behavior that is effective in the short-term, but is fraught with long-term consequences.

Identification of Distressing Situations and Emotions. Participants were asked to monitor for daily stressful situations and their emotional and behavioral responses to such until the next session; this format was used for two reasons. First, this monitoring provided insight and motivation into the situation-emotion-behavior cycle. As the second reason, this provided situations and corresponding emotions for mood induction procedures during each session.

Session 2.

Acceptance and Willingness. Therapist helped participants identify times when efforts to control or avoid internal experience have led to behavior problems, such as problems with abstinence. The emphasis was on classifying ineffective strategies in order to enhance motivation to learn alternatives. Therapists provided the rationale for approaching previously avoided internal stimuli. Through exercises and metaphors, participants identified that the presence of aversive internal experiences does not, in and

of itself, constitute a threat. Moreover, clients were taught that internal experiences do not need to determine behavior. The purpose of this component was to reduce motivation for avoidant behavior and to increase tolerance for discomfort.

Mood Induction/Behavioral Practice. As noted above, participants were asked to engage in imaginary exposure to distress. After learning each skill, participants were asked to choose a scenario from their list of distressing emotions/situations and utilize the newly-learned skill for tolerating distress. Therapist provided support and reinforced approach responses to previously avoided aversive inner experiences. As a measure of skill acquisition/actual engagement in acceptance and willingness, clients were asked to journal or verbalize their thoughts and feelings. After 20 minutes of journaling/verbalizing, clients were walked through progressive muscle relaxation procedures if necessary, and the therapist monitored (via SUDS ratings) that the client's mood has improved to at least a half-point from beginning of the procedures before terminating the session. The goal of this component was to alter the function of interoceptive stimuli by extinguishing conditioned stimuli associated with avoidant responses, and adding operant approach response functions. To help skills generalize across settings, participants practiced exposure as a component of homework.

Session 3

"Healthy Distraction" Skills. Drawing from Linehan's (1993) distress tolerance module (and to a lesser extent, from Lejuez and colleagues', 2003 behavioral activation treatment), patients were trained to emit a broad range of adaptive active coping responses when confronted with internal triggers. The goal was to develop realistic behavioral alternatives to the negatively reinforced avoidant behavior. Additionally,

“healthy distraction” often has the benefit of attenuating negative affect and may enhance impulse control, as well as giving clients “perspective” on a given distressing situation.

Mood Induction/Behavioral Practice. After learning the skill in question, participants engaged in behavioral exposure strategies as described above. As a measure of skill acquisition/actual engagement in “healthy distraction” skills, clients were asked to describe to the therapist a recent positive experience that they have had. The check for skill acquisition lasted for 20 minutes. After the completion of this component, the therapist walked the patient through progressive muscle relaxation.

Session 4

Interpersonal Effectiveness. Drawing from Linehan’s (1993) interpersonal effectiveness module, participants were taught healthy and effective ways of interacting with others and solving interpersonal difficulties, regardless of the presence of distress and as a way to actively manage distress. These skills were to be used when active, goal-oriented behavior was appropriate for alleviating emotional discomfort, or necessary in order to not make a situation worse. Moreover, this module taught patients to layer skills, such that distraction or acceptance skills are used in conjunction with interpersonal effectiveness skills (i.e., before, during, or after a difficult interpersonal interaction).

Mood Induction/Behavioral Practice. After learning the skill in question, participants engaged in behavioral exposure strategies as described above. To ensure acquisition/engagement for the interpersonal effectiveness skills, clients were asked to use these skills on the therapist. The check for skill acquisition lasted for 20 minutes. After the completion of this component, the therapist walked the patient through progressive muscle relaxation.

Sessions 5-6.

”Layering” and Skill Rehearsal. Participants were taught to “layer” skills (i.e., to choose two or more skills and implement them). The aim of this module was to teach participants how to choose the most appropriate skill(s) when faced with complicated/intense emotions, or when the utility of one particular skill was depleted.

Mood Induction/Behavioral Practice. Participants practiced choosing the most appropriate self-regulation skill from their now-acquired list of “tools”. Both of these sessions included a component of skill acquisition/engagement check as well as progressive muscle relaxation.

Supportive Counseling (SC)

To control for the non-specific elements of therapist contact, approximately one-third of the patients received SC, which also consisted of six individual sessions over 3 weeks. This treatment did not follow a clearly defined theoretical model, and was best described as unconditional support, combined with information and advice on managing current problems that a given patient may be experiencing. Although the format was rather open, therapists were provided with a manual providing a script for the initial session as well as potential topics for discussion and corresponding prompts. These included (but were not limited to) day to day annoyances/issues in the treatment center, likes and dislikes about the center, discussions of drug court status and concerns related to this, discussions of families and relationships, concerns about leaving the center, spirituality, relaxation and leisure time, and employment and finances. SC specifically avoided acceptance or mood induction techniques.

Therapist Adherence and Competence

Approximately 50% of the sessions were audiotaped, and supervision was held weekly. During supervision, progress of therapy was discussed, and the supervisor provided feedback to therapists if they were deviating from the protocol. Approximately 40% of treatment tapes were rated by an independent rater (i.e., not associated with the treatment delivery) to assess therapist adherence to and competence with the treatment protocol, using separate rating checklists and scales developed for the SC and SIDI protocols. For each treatment, specific therapist behaviors were considered “prescribed” and “proscribed” (Waltz et al., 1993), in order to assure that the treatment delivered in each of the protocols was distinct from the other. Dr. Daughters reviewed approximately two of five tapes (20%). Participants’ adherence was assessed by their attendance at program sessions and homework completion.

Measures

Measures are organized into three domains: (a) demographic and clinical, (b) social-cognitive predictors and non-specific therapy variables, and (c) experiential avoidance/distress tolerance. A table outlining each domain and the particular measures assessing each domain is provided below (see following page).

<u>Domain</u>		<u>Measure</u>	<u>Purpose</u>
Demographics, Psychopathology, and Treatment Motivation			
		Demographics Sheet	Basic information on age, gender, race, education level, marital status, and total household income.
		SCID-NP, DIPD	Diagnostic Information (All Axis I Psychopathology, Select Assessment of Character Disorders)
		Medication Sheet	Type of Various Medications, including psychotropic, non-psychotropic, and over-the-counter medication
		DUDIT	Further assessment of drug use (quantity/frequency)
		Legal Status	Assessment of whether individual was court-mandated into treatment or not
		ASI/SIP-R	Assessment of addiction severity
		SOCRATES	Assessment of treatment motivation
Therapy-Specific Covariates and Secondary Outcome Variables:	Social-Cognitive Predictors	CES-D	Further assessment of affective distress
		NMRE	Assessment of expectancies of one's regulation of mood
		BSCQ	Assessment of self-efficacy to cope with distressing feelings
		RWCCL/CBI	Assessment of disengagement coping
		DERS	Emotion regulation as indicated by composite of: non-acceptance of negative emotions, inability to engage in goal-directed behaviors when distressed, "emotional" impulse dyscontrol, lack of access to regulation strategies, lack of emotional awareness, and lack of emotional clarity
	Non-Specific Therapy Factors	CALPAS-Brief	Therapeutic alliance
		Program Satisfaction	Assessment of the Salvation Army program satisfaction
Main Outcome Variables	Task persistence	PASAT-C	Measures psychological distress tolerance behaviorally
		Mirror-Tracing-C	Measures psychological distress tolerance behaviorally
	Experiential avoidance	AAQ	Self-report measure; focus on experiential avoidance

Demographic and Clinical Baseline Measures

Demographic Questionnaire and Treatment History

A short self-report questionnaire was administered to obtain age, gender, race, education level, marital status, and total household income. Regarding treatment history, a brief, self-report measure assessed number and duration of past treatment attempts; further, participants were asked if they were or were not mandated to enroll into treatment.

Current substance use disorders and other Axis-I and II psychopathology

Assessment of Substance Use Disorders and Related Impairment. The Addiction Severity Index (ASI; McLellan et al., 1992) was administered to assess potential recent and lifetime problem areas such as medical status, employment, drug use, alcohol use, legal status, family/social status, and psychiatric status resulting from substance use. Approximately halfway through the study, changes were made to some of the baseline measures (due to a need for a shorter measure); thus, the ASI was replaced with the Short Inventory of Problems (SIP-R, Feinn, Tennen, & Kranzler 2003), a 15-item test that measures physical, social, intrapersonal, impulsive, and interpersonal consequences of drug and alcohol consumption. Similarly to the ASI, respondents indicate whether each item occurred in the previous 30 days. This scale has previously been shown to have good psychometric properties (Feinn et al, 2003). Statistics in the current study were conducted on z-scores of the two measures.

Structured Clinical Interview for DSM-IV (SCID-NP, non-patient version).

Diagnostic inclusions/exclusions and lifetime prevalence of Axis I diagnoses (including but not limited to alcohol dependence, non-alcohol substance dependence, and current

psychosis) were determined using the Structured Clinical Interview for DSM-IV (SCID – NP, non-patient version; First, Spitzer, Gibbon, & Williams, 1995), and the Structured Clinical Interview for DSM-III-R for Antisocial and Borderline personality disorders (SCID-II-NP), as well as the Interview for DSM-IV Personality Disorders (DIPD-IV; Zanarini, Frankenburg, Sickel & Yong, 1996). Both measures have previously demonstrated high reliability and validity (Spitzer, Williams, Gibbon, & First, 1989).

Medication Questionnaire. To determine if psychotropic or other medication may influence the expected results, we collected data from the subjects by simply asking which medications they are taking currently, and which ones they have been taking in the past week (if any). The following medications were coded as “yes” for presence of medication: selective serotonin reuptake inhibitors, SSRIs; anxiolytics; atypical antipsychotics; other psychotropic medications, and other medications including over-the-counter antihistamines, sleep aids). Once data were collected, medication status was coded as a dichotomous variable (i.e., whether a patient was taking some type of medication described above or not).

Clinical and Social-Cognitive Covariates

The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996). As a measure of motivation, the SOCRATES was originally developed as a parallel measure of the stages of change described by Prochaska and DiClemente (1982). Rather than measuring the original stage constructs, the 19-item SOCRATES loads on three factors which are conceptualized to represent three continuously distributed motivational processes that may underlie stages of change; Ambivalence (i.e., contemplation), Recognition (i.e., precontemplation and determination), and Taking Steps (i.e., action and maintenance). The scale demonstrates

good internal consistency with Cronbach alphas of .83 for Taking Steps, .85 for Recognition, and .60 for Ambivalence. Test-retest reliability coefficients range from .82 to .94.

Non-Specific Therapy and Program Factors

Program satisfaction. A single item was used to assess participants' satisfaction with the residential treatment program. This item, which was embedded within another relevant questionnaire, was administered at the end of the study. Participants used a 7-point Likert scale to indicate agreement or disagreement (1 = disagree strongly; 7 = agree strongly) with the item, "You are satisfied with this program."

The California Psychotherapy Alliance Scale (CALPAS, Marmar et al. 1989) is a self-report scale that is completed by the client and consisting of 5 items that were created to assess four aspects of the alliance: (a) The therapeutic alliance is measured by the Patient Working Capacity scale, (b) the working alliance is assessed by the Patient Commitment scale, (c) the therapist's contribution to the alliance is measured by the Therapist Understanding and Involvement scale, and (d) the patient—therapist agreement on treatment goals and tasks is assessed by the Working Strategy Consensus scale. Each item was rated on a 7-point scale (1 = *not at all*, 7 = *very much so*).

Secondary Outcome Measures, Theoretically Related to Distress Tolerance

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 short self-report scale designed to measure past two week affective components of depressive symptomatology including 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 the general (Chronbach's $\alpha = .85$) and patient (Chronbach's $\alpha = .90$) populations. Six month test-retest reliability on individuals reporting no negative life events was adequate ($r = .54$). Discriminant validity is high between psychiatric inpatients and the general population and moderate among levels of severity within patient groups (Radloff, 1977).

Revised Ways of Coping Checklist, disengagement coping index (RWCCCL; Vitaliano et al., 1985). We used the Revised Ways of Coping Checklist (RWCCCL) to determine the relationship between coping behavior and treatment outcomes, as well as to compare self reported coping behavior to performance on the distress tolerance tasks. The original 60-item measure assesses five coping styles: avoidant (AV), blaming (B), wishful thinking (W), problem focused (PF), and seeks social support (SS). Construct and concurrent validity of the RWCCCL have been well established (Vitaliano et al., 1985). The current study utilized only the scales tapping avoidance (AV) and blaming self (B), as these were the most relevant to the study intervention and study hypotheses. Again, due to the change in the baseline protocol mid-study, this measure was deemed inappropriately long and replaced with the Coping Behaviors Inventory (CBI; Litman, Stapleton, Oppenheim, & Peleg, 1983), which is designed to assess the behaviors and thoughts used by substance-using individuals to prevent, avoid or control the resumption of heavy drinking. The respondent indicated how often he/she uses each coping behavior to avoid relapse. Frequency of use is rated on a four-point scale from 0 (I have usually tried this) to 3 (I have never tried this). Subscales include positive thinking, negative thinking (analogous to blaming self on the WCCL-R), seeking social support, and avoidance/distraction (analogous to the avoidance scale on the WCCL-R). Similar to the

WCCL-R, only a composite of negative thinking and avoidance/distraction scales was used. Statistics were conducted on z-scores of the two measures.

The *Difficulties in Emotion Regulation Scale* (DERS; Gratz & Roemer, 2004) is a 36-item measure that assesses individuals' typical levels of emotion dysregulation across six domains: non-acceptance of negative emotions, inability to engage in goal-directed behaviors when experiencing negative emotions, difficulties controlling impulsive behaviors when experiencing negative emotions, limited access to emotion regulation strategies perceived as effective, lack of emotional awareness, and lack of emotional clarity. The DERS has been found to have high internal consistency ($\alpha = .93$), good test-retest reliability over a period ranging from 4 to 8 weeks ($\rho_T = .88, p < .01$), and adequate construct and predictive validity (Gratz & Roemer, 2004). Items were recoded so that higher scores in every case indicated greater emotion dysregulation, and a sum was calculated.

Situational Confidence Questionnaire (BSCQ; Sobell, Cunningham, Sobell, & Agrawal, 1996). This pencil-and-paper questionnaire consisted of 8 items and assessed the participants self efficacy, or confidence in their ability to resist using drugs during treatment. Specifically, it asked the individual for their predictions about relapse probability. The original Situational Confidence Questionnaire (SCQ; Annis, 1986) was designed to tap eight self-efficacy situations clients report as being precipitants to relapse: unpleasant emotions, physical discomfort, testing control, urges and temptations, pleasant times with others, conflict with others, pleasant emotions, and social pressure to drink. The items are derived from Marlatt's relapse prevention model (Marlatt & Gordon, 1985) and correspond to the subscales designed by Annis and Davis (1988) for the SCQ-100.

High internal consistency has been demonstrated for the 8-item instrument (Cronbach's α = 0.85). In addition, Breslin, Sobell, Sobell, and Agrawal (2000) have demonstrated that the BSCQ provides comparable information to the SCQ-100.

The Negative Mood Regulation Expectancies Scale (Catanzaro & Mearns, 1990) is a 30-item questionnaire that measures generalized expectancies for alleviating negative moods. Participants are asked to indicate the degree to which they believe their use of various coping strategies alters their negative moods. For each item, participants responded on a 5-point scale (strongly disagree = 1 to strongly agree = 5) to a statement completing the stem, "When I'm upset, I believe that..." Sample items included, "I can do something to feel better;" "I'll feel okay if I think about more pleasant times;" "Thinking that things will eventually be better won't help me feel any better" (reverse scored); and "Going out to dinner with friends will help." Thus, a high score on the NMR Scale indicates a strong belief that one can alleviate negative moods. The NMR Scale has a high level of internal consistency and is a unifactorial scale. It correlates in theoretically predicted ways with measures of depression, anxiety, coping responses, and emotional states, and has demonstrated discriminant validity from social desirability, locus of control, and depression (Catanzaro, 1996; Catanzaro & Greenwood, 1994; Kirsch, Mearns, & Catanzaro, 1990).

Main Outcome Measures 1: Distress Tolerance and Experiential Avoidance

Computer-based Psychological Distress Tolerance Tasks

Psychological Stressor 1: Computerized Mirror-Tracing Persistence Task (MTPT-C). A computerized version of the Mirror Tracing Persistence Task (MTPT;

Quinn, Brandon, & Copeland, 1996) was used as a psychological stressor (MTPT-C; Strong et al., 2003). The MTPT has been used previously to increase participants' frustration, stress, blood pressure, and pulse (Matthews & Stoney, 1988; Tutoo, 1971). Brandon et al (2003) reported that the MTPT predicted sustained abstinence throughout 12 months of follow-up in 144 smokers. Moreover, persistence predicted outcome independent of other significant predictors: gender, nicotine dependence, negative affect, and self-efficacy. The MTPT-C has been used with the proposed sample and predicted dropout from the treatment center above and beyond self report measures assessing characteristics previously demonstrating a relationship with residential substance abuse treatment dropout, namely demographic variables, mood variables, levels of psychopathology, substance-use severity, social support, and treatment readiness (Daughters, Lejuez, Bornoalova et al., 2005). For the task, participants are required to trace a red dot along the lines of a star using the computers mouse. To make the computer version similar to the original mirror tracing task, the mouse was programmed to move the red dot in the reverse direction. For example, if the participant moves the mouse to the left then the red dot moves to the right and so on. To increase the difficulty level and frustration, if the participant moved the red dot outside of the lines of the star or if the participant stalls for more than 2 seconds then a loud buzz sounded and the red dot will return to the starting position. Participants were told that they can end the task at any time by pressing any key on the computer, but that how well they do on the task will affect how much money they make. After receiving instructions the participants began the task and worked independently until the seven minute maximum, at which time the task was terminated. The participants were not told the maximum duration prior to beginning the

task. Distress tolerance was measured dichotomously (i.e., did the participant terminate the task or did he/she persist through it?)

Psychological Stressor 2: Paced Auditory Serial Attention Task (PASAT). We used a modified computerized version of the PASAT (Lejuez, Kahler, & Brown, 2003) which has been shown to increase subject stress levels (Deary et al., 1994). Persistence on this task has been reported to predict length of smoking cessation attempt (Brown et al., 2002), length of previous abstinence attempt among illicit drug users (Daughters, et al., 2005), and dropout from the proposed residential substance abuse treatment center above and beyond relevant covariates (Daughters, Lejuez, Bornovalova, et al., 2005). For this task, numbers are sequentially flashed on a computer screen, and participants are asked to add the presented number to the previously presented number before the subsequent number appears on the screen. As the task is designed to limit the role of mathematical skill in persistence, the presented numbers only range from 0 to 20, with no sum greater than 20. Previous studies with smokers have required participants to provide answers by using the mouse to click on the correct answer on a number pad displayed on the screen. Due to limited computer proficiency in the current sample, however, participants provide answers verbally. Participants were told that their score increases by one point with each correct answer and that incorrect answers or omissions would not affect their total score. The task consists of three levels with varying latencies between number presentations. Specifically, the first level of the PASAT provided a 3-s latency between number presentations (i.e., low difficulty), a 2-s latency during the second level (i.e., medium difficulty), and a 1-s latency during the final level (i.e., high difficulty). The first level lasts for 3 min and the second level lasts for 5 min. Following a 2-min brief rest

period, the final level continues for up to 7 min, with the subject having a termination option. Specifically, participants were informed that once the final level has begun they can terminate exposure to the task at any time by informing the experimenter; however the amount of money they made at the end of the session would depend upon their performance on the task. Distress tolerance is indexed as latency in seconds to task termination.

Thus, both the MTPT and PASAT have served as the main predictors in the studies conducted by our group, and our data indicates that the MTPT and PASAT are robust predictors of treatment failure (e.g., Daughters et al, 2005; Daughters et al, 2005). Distress tolerance was measured dichotomously (i.e., did the participant terminate the task or did he/she persist through it?)

Self-reported distress during all tasks (Manipulation Check). A series of single-item questions rated on a Likert scale ranging from 0 (none) to 100 (extreme) were used to assess moment-to-moment levels of (a) anxiety, (b) frustration/irritability, and (c) discomfort during the tasks. Ratings were provided between level 2 and 3 on the challenge tasks instead of at the end of the task to control for time on the task. These items were selected on the basis of their relevance for sensitivity to psychological distress and have been used in previous studies (e.g., Brown, Lejuez et al., 2002; Daughters et al., 2005; Daughters, Lejuez, Bornovalova, et al., 2005).

Construct Validity of Distress Intolerance

The Acceptance and Action Questionnaire (AAQ; Hayes et al, 2004). The 16-item AAQ was designed to measure psychological acceptance, emotional willingness, and the tendency to engage in experiential avoidance. Each item is rated on a 7-point Likert scale

(1 = ‘never true’ to 7 = ‘always true’). Sample items include: “I’m not afraid of my feelings” and “When I feel depressed and anxious, I am unable to take care of my responsibilities.” High scores indicate more experiential avoidance; low scores indicate more psychological acceptance/willingness.

Main Outcome Measure 2: Treatment Dropout

Treatment Dropout: We calculated four indices of dropout, two continuous and two categorical. First, we had a dichotomous index of whether an individual has dropped out before the completion of 30 days; the second was whether an individual dropped at any time before the completion of his or her contract. The continuous indices were: days missed before the completion of 30 days, and days missed of the residential treatment before the completion of one’s contract.

Statistical Analyses

Preliminary Analyses

As a first step, the equivalence of the random assignment of groups with regard to key baseline characteristics was assessed. This involved comparison of treatment groups on demographic, affective, and cognitive characteristics as well as variables related to emotional avoidance and distress tolerance. If groups differed on any characteristics, these variables were used as covariates across analyses. Although all analyses assumed an alpha of .05, effect sizes were of greater interest than absolute significance, given the small sample size.

Main analyses 1: Does SIDI treatment result in relatively reduced emotional avoidance and greater persistence on behavioral challenge tasks?

The statistical approach adopted for the analyses of the symptom data was repeated measures analysis of covariance (ANCOVA) with group as the independent variable and the particular outcome variable (e.g., experiential avoidance) as the dependent variable. The baseline measure of each variable and BPD status (as percentage of BPD differed across groups, see below) were used as covariates, and the group-by-time interaction provided the measure of the significance of treatment effect on most measures.

Clinical Significance of Change

To determine the clinical significance of the treatment effects, an approach consistent with that proposed by Jacobson and Truax (1991) was utilized, requiring that participants (a) report a statistically reliable magnitude of change, and (b) reach normative levels of functioning. Statistically reliable magnitude of change (Reliable Index of Change, RCI) is calculated by adding (or subtracting, in the expected direction) the pre-test standard deviation of a particular measure from an individual pre-test score. If at a post-therapy assessment a participant receives a score higher (or lower) than the sum above, they are said to have reached a reliable change. The cutoff for normative levels of functioning is calculated by adding (or subtracting, in the expected direction) two pre-test standard deviations of a particular measure from the grand mean of the measure pre-test. If at the post-therapy assessment an individual passes this cutoff, they are said to have "recovered", or moved into the distribution of functional patients. According to Jacobson and Truax (1991), an individual at the post-therapy assessment can fall into one of four categories: recovered (individual has passed the normative cutoff and RCI in the positive

direction), improved (has passed RCI in the positive direction but not the normative cutoff), unchanged (has passed neither criterion), or deteriorated (has passed RCI in the negative direction).

Main analyses 2: Does a distress tolerance treatment for individuals presenting with low distress tolerance lead to a longer stay in treatment and less dropout?

Different statistical analyses were conducted for dropout at 30 days (drop-30) and dropout at any point (drop-any). Dropout at 30 days was dichotomized (dropped or not) and a chi-squared analyses was conducted. To examine the effects of treatment condition on dropout over the maximum possible treatment duration of 180 days, we ran discrete-time survival analyses. Specifically, we used Cox proportional hazards regression to predict time left before completion of treatment. In these analyses, subjects' data were censored at the point at which they successfully completed their treatment contracts. Therefore, more sparse data were available for risk of dropout at the later time points. Treatment contract duration was entered as a covariate, as longer contracts are more difficult to complete.

Setting the Stage for Future Mediation Studies: Is Change in Distress Tolerance Related to Dropout?

The design and sample size in the current study making formally examining mediation prohibitive. However, it is worthwhile to test the *individual* mediational steps, without testing mediation per se. This approach sets the stage for future, large-scale studies that would allow full testing of mediation. In brief, support for a mediational effect is dependent upon four criteria: (1) a significant direct effect of an independent variable (treatment condition) on a dependent variable (treatment dropout/retention); (2)

significant effects of an independent variable on putative mediators (distress tolerance and experiential avoidance); (3) significant effects of putative mediators on the dependent variable; (4) significant indirect (i.e., mediated) effects of the independent variable on the dependent variable when it is analyzed in conjunction with the mediators. Thus, our analysis examines evidence for the first through the third step of mediation, although the fourth step is left out due to small sample size. The analyses for the first two steps are described above. For the third step, we utilized Cox proportional hazards regression to examine the effects of change in distress tolerance tasks on dropout over a thirty-day period as well as the maximum possible treatment duration of 180 days.

Chapter 3: Results

Preliminary Results: Baseline Characteristics and Potential Demographic and Clinical Descriptives and Covariates

Demographic Characteristics:

As shown in Table 1, subjects assigned to the three treatment conditions (i.e., SIDI, SC, and TAU) were compared on several demographic characteristics, treatment history (i.e., whether an individual has attended treatment in the past, coded yes = 1 and no = 0), and drug court status (if a subject was legally mandated to attend residential treatment, or of he or she entered of his or her own volition). Education was coded as less than high school; high school or equivalent; and some college and above. Because the rates of non-African American and non-single participants were so low, we dichotomized these two variables (i.e., African-American versus other; single versus non-single). There were no differences across the three treatment conditions on any of these variables (all $ps > .1$).

Diagnostic and Medication Status

The presence of Axis I and theoretically-relevant Axis II disorders [i.e., Borderline Personality Disorder (BPD) and Antisocial Personality Disorder (ASPD)] as well as medication status (a dichotomous variable indicating if the subject was taking one of the following medications: selective serotonin reuptake inhibitors, SSRIs; anxiolytics; atypical antipsychotics; and other psychotropic medications) are presented in Table 2. Treatment conditions did not differ across any of the above variables except Borderline

Personality Disorder ($\chi^2 = 9.08$; $p < .01$), indicating a higher percentage of BPD in the SIDI group (50% in SIDI, 10.5% in SC; 20% in TAU). Based on this significant difference across groups, BPD was entered as a covariate in all main analyses.

Addiction-Related Problems and Motivation for Change

Overall and group means for the composite score of ASI and SIP as well as change motivation are presented in Table 3. There were no differences across treatment conditions in either addiction-related problems or treatment motivation (all p 's $> .31$).

Manipulation Check, Correlations, and Therapy-Related Covariates

Correlations between Measures

Correlations between measures at pre- and post-therapy assessment are presented in Table 4. Additionally, it was important to assess whether post-distress tolerance task affect was related to termination of these tasks. Results indicated that quitting of the tasks was not related to a composite measure of post-test dysphoria at the baseline ($r = .11$, $p = .41$) or post-therapy assessment ($r = .26$, $p = .07$) assessments. As such, dysphoria/negative affect was not controlled for in the following analyses (described below) on distress tolerance.

Non-Specific Therapy and Program Factors

A comparison between groups on the measure of therapeutic alliance (CALPAS) was conducted only for individuals who completed more than 2 sessions of SIDI or SC, based on the notion that therapeutic alliance forms over time. Of note, only one person completed less than two sessions of therapy (in this case, SC); all other participants completed therapy. There were no differences on levels of therapeutic alliance between SIDI and SC (TAU did not fill out the CALPAS as no therapy was performed).

Moreover, there were no differences across the three groups on level of satisfaction with the overall substance use program at the treatment center (all $ps > .05$).

Treatment Adherence

Approximately 50% of the therapy sessions were audiotaped and the tapes were monitored using a therapist adherence checklist to ensure accuracy and consistency across sessions and groups. In addition, 40% of the tapes in both the SIDI and SC conditions were selected randomly for ratings of therapist competence and adherence by an independent evaluator (S. B. Daughters). For SC, ratings were made on a yes/no (yes = 1, no = 0) scale ranging from 0 (complete adherence/competence) to 24 (no adherence/competence) over the course of 6 sessions. Ratings for SC indicated high therapist adherence ($M = 2.3$, $SD = 0.8$) and competence ($M = 4.1$, $SD = 1.1$). For SIDI, ratings were made on a yes/no (yes = 1, no = 0) scale ranging from 0 (no adherence/competence) to 52 (complete adherence/competence) over the course of 6 sessions, with ratings for each session highlighting specific session objectives. Ratings for SIDI indicated high therapist adherence ($M = 49.2$, $SD = 1.9$) and competence ($M = 47.4$, $SD = 1.8$).

Homework Compliance in SIDI

Clients assigned to SIDI were monitored on homework compliance (i.e., practicing newly-acquired skills and monitoring their effectiveness). Homework compliance was checked every session by Ms. Bornovalova; the self-monitoring worksheets were rated on a scale from 1-5 (0-100%) on their completion. Homework completion had a mean (SD) of 63.3 (30.0), ranging from 30 to 100% completion. It should be noted that SIDI was the only group receiving homework, as this was the only

group receiving skills training and needing to practice such. In contrast, there was no homework in SC or TAU.

Depression, Emotion Regulation, and Social-Cognitive Outcomes

Table 5 lists the pre- and post-therapy assessment means as well as significance levels and effect sizes for the repeated measures ANOVAs without BPD added in as a covariate. Beginning with depressive symptomatology (CES-D), there was no interaction between time and condition [$F(2, 60) = .965, p = .39; \eta^2 = .03$]. However, there was a main effect of time [$F(1, 60) = 10.02, p = .002; \eta^2 = .14$], indicating a decrease in depression simply as a function of time.

On the Difficulties in Emotion Regulation Scale (DERS), there was no interaction between time and condition [$F(2, 61) = .38; p = .68; \eta^2 = .01$], and the main effect of time was also non-significant [$F(1, 61) = .61; p = .44; \eta^2 = .01$].

On the index of disengagement coping, there was no interaction of time by condition [$F(2, 60) = .79; p = .46; \eta^2 = .03$] and no main effect of time [$F(1, 60) = .16; p = .68; \eta^2 = .003$]. Similarly, on the situational confidence questionnaire (SCQ), there was no interaction between condition and time [$F(2, 61) = .76, p = 0.44; \eta^2 = .03$]; however, the main effect of time was significant [$F(1, 560) = 14.22, p < .001; \eta^2 = .19$]. Finally, on the negative mood regulation expectancies (NMR) scale, the interaction between time and condition approached significance [$F(2, 55) = 2.13; p = .07; \eta^2 = .09$], and the effect of time was significant [$F(1, 55) = 9.99; p = .03; \eta^2 = .15$].

Main analyses 1: Does SIDI treatment result in relatively reduced emotional avoidance and greater persistence on behavioral challenge tasks?

Experiential Avoidance

The Acceptance and Action Questionnaire (AAQ) produced significant results. Specifically, the time-by-condition interaction was significant [$F(2, 56)=3.23, p<0.05$; $\eta^2 = .10$], and there was also a main effect of time [$F(1, 56) = 10.04; p < .01$; $\eta^2 = .15$]. To test the specific effects of each group, we conducted a univariate ANOVA on a change index of the AAQ. Results indicated that the AAQ scores decreased substantially in the SIDI group compared to the TAU group ($p < .05$), as well as compared to SC ($p < .05$). There were no differences between SC and TAU ($p = .99$).

Distress tolerance tasks

As mentioned above, the outcome measure for distress tolerance tasks was defined as the number of tasks quit prematurely. To obtain this count we dichotomized the performance of each subject on each of the tasks at both baseline and post-therapy assessments. As mentioned above, the mean of self-reported post-task dysphoria was not related to quit status at either the baseline or post-therapy assessment. For the ANCOVA, pre-therapy number of tasks quit was entered as a covariate, post-therapy number of tasks quit was entered as the dependent variable, and treatment condition was entered as the independent variable. The ANCOVA was significant, with a robust effect size of treatment on distress tolerance. Specifically, our results indicated a significant interaction between group and time [$F(2, 58) = 7.37; p < .001$; $\eta^2 = .21$], and the effect of time approached significance [$F(1, 58) = 3.52; p = .07$; $\eta^2 = .057$]. To test contrasts between groups, we again utilized the change score in number of tasks quit as the dependent variable in a univariate ANOVA. Results indicated that SIDI decreased compared to

TAU ($p < .01$) and SC ($p < .001$). There were no differences between SC and TAU ($p = .80$).

Covariate Follow-Ups

Of note, controlling for BPD did not change the significance indicated in the analyses above on any of the measures except for the AAQ. Specifically, when BPD status was entered as a covariate in the ANCOVA of condition on AAQ, the time by condition status interaction [$F(2, 54) = 1.95; p = .15$], became non-significant, although the effect size still remained relatively large ($\eta^2 = .07$). However, there was still a main effect of time [$F(1, 54) = 5.92; p < .05; \eta^2 = .10$].

Clinical Significance of Change

Table 6 presents rates of change and improvement in accordance with the Jacobson and Truax criteria. Of note, the Jacobson and Truax analyses were conducted using self-report scales, but not the computer tasks, as the small range that one can obtain on the distress tolerance tasks (number of tasks quit, ranging from 0-2) would not allow meaningful interpretation. Of note, the following section presents rates of change across conditions, but only for categories (i.e., deteriorated, no change, improved, recovered) that had more than zero subjects falling in the category. If rates for a particular category are not reported (e.g., deteriorated), they should be assumed to be zero.

Beginning with the CES-D, 42.9% in the SIDI condition, 22.2% in the SC condition, and 21.7% in the TAU condition can be considered improved. Similarly, on the SCQ, the SIDI condition contained 22.7% improved and 9.1% recovered individuals at post-therapy assessment, compared with 11.1% improved and 5.5% recovered in SC, and 10.5% improved and no recovered individuals in TAU. On the measure of

disengagement coping, out of individuals in the SIDI condition, 9.1% deteriorated, 22.7% improved, and 4.5% recovered. In the SC condition, 21.1% deteriorated, and 31.6% improved (but no one recovered). A similar pattern was found on the DERS. Specifically, in the SIDI condition, 4.5% deteriorated, and only 9.1% improved. In the SC condition, 5.2% deteriorated and 22% improved. Finally, in TAU, 15.8 deteriorated and only 5.3% improved. No one, across any conditions reached normative functioning on this measure. In the TAU condition, 21.7% deteriorated, and only 4.3% improved, with zero percent recovering. In contrast, on the NMR expectancies scale, 40.9% in the SIDI condition improved and 5% recovered, contrasted with 11.1% improved and 5.5% recovered in SC and 10.5% and zero recovered in TAU. Findings are tiered in a similar manner when considering the main outcome variable of experiential avoidance (AAQ). In the SIDI condition, 38.1% of the individuals have improved and 9.1% recovered. In contrast, in the SC and TAU conditions, only 16.6 and 10.5% (respectively) have improved, and no recovered. Thus on every measure except for DERS and disengagement coping, a trend was evident such that the highest percentage of improvement and normative functioning at post-therapy assessment was evident in SIDI, followed by SC and TAU.

Following from these results we conducted a series of chi-square analyses to determine whether there were differences in percent change across conditions. Due to the rather small sample size, we collapsed categories “improved” and “recovered” into a single category, which we conservatively labeled “improved”. The omnibus chi-square statistic was not significant for CES-D ($\chi^2 = 2.94, p = .23$), disengagement coping ($\chi^2 = 7.06, p = .13$), SCQ ($\chi^2 = .50, p = .78$), or DERS ($\chi^2 = 1.86, p = .76$). As such, no follow-up contrasts were conducted on these measures. However, there was an effect of

condition on percentage improvement on the NMRE ($\chi^2 = 7.61, p = .022$). Follow-up analyses indicated that percentage improvement in SIDI was significantly higher than in SC ($\chi^2 = 3.74, p = .05$). SIDI had a significantly higher percentage of improvement than TAU ($\chi^2 = 6.01, p = .016$). Percentage of improvement between SC and TAU was not significantly different ($\chi^2 = .3, p = .47$). Finally, similar results were found for the AAQ. Specifically, there was a significant effect of treatment condition on percentage of improvement on the AAQ ($\chi^2 = 5.91, p = .05$). Follow-up analyses indicated that percentage improvement between SIDI and SC was not significantly different ($\chi^2 = 2.77, p = .09$). SIDI had a significantly higher percentage of improvement than TAU ($\chi^2 = 4.79, p = .031$). Percentage of improved in SC and TAU was not significantly different ($\chi^2 = .3, p = .47$).

Main analyses2: Does a distress tolerance treatment for individuals presenting with low distress tolerance lead to a longer stay in treatment/relatively less dropout?

The first step in examining the relationship between treatment condition and treatment dropout out of the residential treatment center was to simply examine the means of days left until completion and rates of dropout across conditions². First, when we examined differences in days left until completion across the 30-day contract [SIDI, Mean = 0 (0); SC, Mean = 0 (0); TAU; .61 (2.14)] and across the entire contract [SIDI, Mean = 2.59 (9.51); SC, Mean = 12.83 (32.57); TAU; 3.25 (8.0)]. Regarding the 30-day contract, a univariate ANOVA revealed that the effect of condition was not significant [$F(2, 60) = 1.6; p = .21; \eta^2 = .05$]. Regarding dropout throughout the entire treatment period across all contracts, a univariate ANCOVA, controlling for contract length

revealed that the contract, the omnibus F was significant [$F(3, 59) = 8.98, p < .000$]; however, the effect of condition failed to reach significance [$F(2, 59) = 1.54, p = .22$; $\eta^2 = .05$]. Next, we examined rates of dropouts across groups. When dropout at or before the completion of 30 days was used as a dependent variable, the rates were as follows: there were no dropouts in the SIDI or SC conditions (0%), and 4 individuals (16%) dropped out of the TAU group, resulting in an overall sample dropout rate of 6.1%. In contrast, when dropout at any point in treatment (thus including any time in their contract after SIDI was completed) was used as a dependent variable, the rates were somewhat different. Specifically, 9.15% ($n = 2$) of the SIDI condition, 15.6% ($n = 3$) of the SC condition, and 20% ($n = 5$) of the TAU condition dropped out of the residential treatment center.

For dropout at 30 days (drop-30), the chi-square analysis revealed that there was an overall difference in dropout rates across groups ($\chi^2 = 6.98, p < .05$). There were no differences in drop-30 between SIDI and SC conditions. The difference between SC and TAU approached significance ($\chi^2 = 3.34, p < .067$), and the difference between SIDI and TAU was significant ($\chi^2 = 3.85, p = .05$). The fact that the contrast between SIDI and TAU was significant and between SC and TAU was not most likely stemmed from a smaller sample size in the SC group.

To examine the effects of treatment condition on dropout over the maximum possible treatment duration of 180 days, we used Cox proportional hazards regression to predict time left before completion of treatment. The full model predicting the effect of treatment condition on dropout risk was significant ($\chi^2 = 9.92, p = .019$). However, the effects of individual treatment conditions were not (SC: Wald = .82, $p = .34$; hazard ratio

(HR) = .27; SIDI: Wald = 1.5; $p = .22$; HR = .03). Despite the lack of significance at an individual treatment condition level (which most likely stems from the small sample size and low rates of dropout across conditions), it is still worth noting that the hazard ratio of SIDI equaled .03, suggesting that it serves a protective function in risk of dropout; this is consistent with the fact that individuals in SIDI treatment completed more days of their contract.

Supplementary Analysis: Is Change in Distress Tolerance Related to Dropout?

We ran two sets of analyses examining whether distress tolerance was related to dropout. The first set of analyses simply replicated the methods of Daughters et al (2005). Specifically, we utilized Cox proportional hazards regression to examine the effects of pre-therapy assessment distress tolerance on dropout over a thirty-day period as well as the maximum possible treatment duration of 180 days. In the first analyses examining dropout or completion at 30 days subjects' data were censored at the point at which they successfully completed the 30-day period. The full model predicting the effect of pre-therapy assessment distress tolerance on dropout risk was not significant ($\chi^2 = .154$, $p = .67$).

When considering retention/dropout over the maximum possible treatment duration of 180 days, we used the same analyses. Subjects' data were censored at the point at which they successfully completed their treatment contracts. Contract time was entered as a covariate. The full model predicting the effect of pre-therapy assessment distress tolerance on dropout risk was significant ($\chi^2 = 11.89$, $p < .01$). However, the effect of distress tolerance tasks alone was not (Wald = 2.16; $p = .14$; HR = .056).

Second, we utilized Cox proportional hazards regression to examine the effects of change in distress tolerance tasks on dropout over a thirty-day period as well as the maximum possible treatment duration of 180 days. In the first analyses examining dropout or completion at 30 days subjects' data were censored at the point at which they successfully completed the 30-day period. The full model predicting the effect of change in distress tolerance on dropout risk was not significant ($\chi^2=1.36, p = .32$).

When considering retention/dropout over the maximum possible treatment duration of 180 days, we used the same analyses. Subjects' data were censored at the point at which they successfully completed their treatment contracts. Contract time was entered as a covariate. The full model predicting the effect of change in distress tolerance on dropout risk was significant ($\chi^2=8.3, p = .016$). However, the effect of the change in the distress tolerance tasks alone was not (Wald = .29; $p = .59$; HR = .61).

Chapter 4: Discussion

The current study compared a specialized and novel behavioral distress tolerance treatment, namely Skills for Improving Distress (SIDI) to Supportive Counseling (SC) and a Treatment-as-Usual group (TAU) among individuals who evidenced deficits in distress tolerance. Specifically, we examined these treatments' effects on a) levels of distress tolerance, b) variables theoretically associated with distress tolerance (namely, levels of negative affect, disengagement and avoidance coping, emotion regulation, self-efficacy in high-risk situations, self-efficacy of mood regulation), and c) treatment dropout. Beginning with the effects on distress tolerance and experiential avoidance, findings indicated that individuals in the SIDI condition achieved a greater improvement in distress tolerance than the two comparison conditions, and treatment condition accounted for 21% of the variance in distress tolerance scores. Similarly, individuals in the SIDI condition evidenced greater improvement on the self-report measure of experiential avoidance, although these findings became non-significant after controlling for BPD. Nevertheless, the effect size remained moderate, even after covarying out BPD (with treatment condition accounting for 7% of the variance). Finally, when considering percentage of individuals who reached clinically significant improvement on the AAQ, a significant effect emerged such that more individuals in SIDI reached improvement than in the comparison conditions.

When considering secondary outcome measures of negative affect, disengagement coping, self-efficacy in high-risk situations, and self-efficacy of mood regulation, the pattern of findings were somewhat different from those above. The largest

effect size was found on the measure of negative mood regulation expectancies, defined as self-efficacy in one's ability to terminate or alleviate a negative mood state. Again, although group differences were not statistically significant, the effect size was reasonably robust, with treatment condition accounting for 6% of the variance. Further, when considering percentage of individuals reaching clinically significant improvement in SIDI contrasted with the other two conditions, a significant effect emerged.

In contrast, we found no post-therapy assessment group differences in levels of negative affect, disengagement coping, and self-efficacy in high-risk situations. Of note, however, when considering percentage of individuals achieving clinically significant improvement as well as percentage of those achieving normative functioning, on several of these measures, a trend was evident such that the highest percentage of improvement and normative functioning at post-therapy assessment was evident in SIDI, followed by SC and WLC. Thus, while the small sample size precludes finding statistical significance, the differential rates of improvement provide encouraging data for testing SIDI in larger studies in the future.

Findings were less clear when considering treatment dropout as an outcome variable. Specifically, when considering 30-day dropout, SIDI and SC did not differ, as neither condition had any dropouts. Instead, all treatment attrition at this stage took place in the TAU condition (16% dropout rate). Of note, when a longer-term outcome variable was considered (dropout over the course of the maximum duration of treatment), differences between treatment conditions began to emerge in the hypothesized direction (albeit not strong enough for statistical significance). Specifically, we found that across the maximum treatment duration, 4.5% ($n = 1$) of the SIDI condition, 15.6% ($n = 3$) of

the SC condition, and 20% ($n = 5$) of the TAU condition dropped out of the residential treatment center. It also should be noted that the examination of hazard ratios suggested that being placed in the SIDI condition serves as a protective factor in dropout. Future larger-scale studies will show whether this trend for differences in rates of dropout is genuine or serendipitous. Finally, the current study found that the change in distress tolerance was not related to treatment dropout in correlational or regression analyses.

The current results indicate the effectiveness of SIDI in improving experiential avoidance and distress tolerance. In turn, this suggests the potential utility of adding this short-term intervention to existing treatment as usual. First, treatment effects were observed even despite the brief duration of the treatment. Second, SIDI had 100% retention (in the experimental therapy rather than in the residential center), despite asking clients the rather difficult task of simultaneously approaching previously avoided emotions and refraining from engaging in previously relied upon coping strategies. The 100% retention in SIDI itself is likely helped by the treatment's relatively short duration. Nevertheless, the brevity of this treatment adds to its utility as an add-on in residential substance use centers. Indeed, substance abuse treatment programs, even those that are strongly grounded in empirical investigations, are usually implemented by community counselors with minimal training in the theory and practice of empirically supported interventions. Given the intensity and complexity of programs such as DBT, as well as the need to understand the theoretic underpinnings of the treatments, the effectiveness of the entire treatment protocols when implemented by those with minimal training may be limited. Additionally, DBT (to take an example) is extremely time intensive and costly; for instance, Linehan's DBT trials traditionally last at least one year (Linehan, 1993),

with clients attending multiple sessions (group and individual) per week. In the current economic environment (that is, when funding for substance use treatment programs is limited), this rigorous treatment schedule is difficult to implement. As such, the use of SIDI, a short treatment protocol, may serve as a more feasible alternative to long-term programs such as DBT in achieving similar goals. Finally, it should be noted that this improvement occurred despite the significantly larger proportion of individuals with BPD in SIDI. Numerous studies in the past have noted that the co-occurrence of BPD and substance use disorders is difficult to treat, in part due to large rates of dropout (see Bornovalova and Daughters, in press for a review). As such, the fact that individuals in SIDI had considerably greater improvement than those in SC and TAU is notable.

The effect on NMR expectancies is also worthy of discussion. Since past studies indicate that NMR expectancies are negatively related to the use of drug/alcohol use as a coping mechanism (Catanzaro & Laurent, 2004), as well as actual problem drinking (Catanzaro & Laurent, 2004; Kassel, Jackson, Shannon, & Unrod, 2000), it is possible that an increase in NMR expectancies would in turn be related to a reduction in actual drug/alcohol use. The increase in NMR in the SIDI group is also consistent with the actual content of SIDI. That is, as participants acquire new skills in tolerating and managing affective distress, and it is reasonable that the confidence and self-efficacy in using such skills improves correspondingly.

Another interesting finding concerns the fact that there were no dropouts out of residential treatment in the SIDI or SC groups at 30 days post treatment entry. These findings are consistent with those of Linehan et al. (2002). Specifically, Linehan and colleagues compared an active treatment (Dialectical Behavior Therapy) to

Comprehensive Validation Therapy (CVT) in combination with participation in a 12-Step program among a sample of patients with comorbid BPD-SUD. CVT is a manualized approach that aims to provide therapeutic warmth, responsiveness, and empathy, with no formal problem solving or skills acquisition training. Interestingly, CVT was unusually effective in maintaining subjects in treatment. Specifically, 100% (12 out of 12) stayed for the entire year. In contrast, premature dropout rate in DBT was 36%, significantly higher than in CVT. Although it is tempting to interpret both Linehan's and our findings as demonstrating the utility of therapeutic alliance and related factors in client treatment retention, Linehan and colleagues point out that an absence of an explicit focus on behavioral change is likely an important factor in maintaining clients in treatment. Similarly, a number of studies indicate that therapist-client frequent contact is an important variable in treatment retention (Craig, 1985; Fiorentine & Anglin, 1997). Again, this complicates interpretation of the findings, since for lasting outcomes, a focus on behavioral change is necessary (Linehan et al., 2002). In the context of the current study, a similar statement may be made. That is, retention at the 30-day mark is simply the first step in lasting behavior change, and a focus on skills training and skills generalizability is crucial if the outcome variables are extended to include healthy behavior that is even more difficult to achieve (e.g., drug and alcohol abstinence). This last statement is underscored by the findings that, when considering the entire length of client's contract in the residential treatment, SIDI had the least dropouts, followed by SC and then TAU. These differences in rates are certainly consistent with the interpretation above, emphasizing the need for *lasting* behavioral change. Nevertheless, this interpretation should not invalidate the value of the current findings that suggest that for

the first step in behavior change, namely treatment retention, high contact time as well as therapeutic validation are quite effective in their own right. In turn, these findings imply that community residential drug treatment centers may strongly benefit from incorporating these therapeutic strategies into existing treatments in order to enhance retention.

The lack of a relationship between the change in distress tolerance and treatment retention/dropout is also rather surprising, as in the past, Daughters and colleagues (2005) found that distress tolerance is indeed related to treatment dropout. There are two explanations for this disparate finding. First, it should be noted that two of the dropouts left the center before their post-therapy assessment results could be obtained. Second, the small sample size could also have accounted for these findings. Indeed, the Daughters and colleagues' study utilized 130 individuals in residential treatment, contrasted to 66 participants here. This difference in sample size also explains why we did not find the relationship between baseline distress tolerance and treatment dropout. It is also noteworthy that the correlation between change in distress tolerance and treatment dropout at 30 days was around $-.20$. This relationship could increase or become significant with more participants (on the other hand, it could decrease, indicating a serendipitous finding), and this certainly needs to be investigated in follow-up studies.

Limitations and Future Directions:

The primary limitation of the current study, of course, concerns the modest sample size. The fact that we still found an improvement in distress tolerance and experiential avoidance among those in SIDI, however, testifies to the authenticity of the effect. Another limitation concerned our choice of sample itself. In the current study, we

utilized inner-city African Americans in residential drug treatment, rather than a more demographically heterogeneous sample, or a sample of drug users “at-large.” In this way, our sample is both a major strength and a limitation. Specifically, inner-city African American drug users in residential treatment are an underserved at-risk population (Avants, Marcotte, Arnold, & Margolin, 2003; DHHS, 2003; Ensminger, Anthony, & McCord, 1997), and thus may be most severe and most in need of assistance (and thus, research and consequent prevention and intervention efforts). However, there is also a chance that the current results may not generalize to either a more demographically diverse sample, or a sample of individuals in a less restrictive form of treatment. On the other hand, the fact that a larger, but similar treatment programs (DBT, ACT) have been found to be effective in very different samples (e.g., Caucasian, female psychiatric, upper-to-middle class in-and outpatients; Caucasian substance users) testifies to the potential generalizability of SIDI. Third, although efforts were made to equalize therapy (i.e., SIDI and SC) groups on contact time and therapeutic factors, it remains that those who were in the SIDI received homework (and thus, received somewhat more of a “therapeutic dose” than SC), and those who were in the SC condition did not. Although this was a necessary condition of the treatment program, follow-up research should make efforts to equalize therapeutic contact via homework across groups. A fourth limitation concerns the reliance (albeit not exclusively) on self-report measures of emotional responding may result in biased data. For instance, participants’ responses may be influenced by social desirability and/or their ability to accurately report on their emotional responses. However, the fact that in the SIDI condition, participants improved on both behavioral and self-report measures of experiential avoidance lends support to

the authenticity of this effect. A fourth limitation is related to the fact some of the individuals dropped out before completion of their post-therapy assessment, which precluded getting a measure of change for them. Future studies building on this one would perhaps benefit from administering a “mid-point” test to prevent such loss of data. Fifth, it should be noted that clients in the SIDI and SC conditions and those in TAU were receiving different amounts of payment for their participation (\$50 versus \$20, respectively), since individuals in TAU were not receiving therapy, and thus, did not need to be compensated for such. Most likely, the \$30 difference between conditions would not have accounted for rates of improvement or dropout; however, future studies should keep payment similar across conditions. Finally, although less of a limitation than a future direction, it should be noted that the principal investigator (MAB) conducted the large majority of the SIDI group, thus making it unclear whether these results are generalizable. Thus, future studies would benefit from utilizing therapists other than the primary investigator, a strategy that would also allow one to examine how transportable the newly-developed treatment may be.

Beyond the need for a larger sample size and repeated assessments, future investigations that seek to expand upon the current work could take several directions. For instance, future studies could investigate whether the results are specific to residential centers where a treatment-as-usual interventions are minimal and not theoretically driven, or whether the results will withstand a more conservative test, namely, a replication of the current study in a treatment center with the treatment-as-usual interventions are theoretically and empirically driven. Additionally, it would be interesting and useful to investigate the dose-response relationship of treatment to outcome (distress tolerance,

dropout out of residential treatment centers). Indeed, in a review of 156 papers published on this topic between 1950 and 1992, Orlinsky, Grawe, and Parks (1994) found that 100 (or 64%) of studies showed a positive relationship between treatment length and outcome, 50 studies were unable to detect a statistically significant relationship between treatment length and outcome, and only 6 studies found a negative relationship. For instance, Anderson and Lambert (2001) found that, on average, a "dosage" of 13 sessions of psychotherapy was needed to reach a modest 50% improvement rate. Similarly, Hansen and Lambert (2003) tracked thousands of patients receiving standard psychotherapy. A survival analysis of this data reveals that between 15 and 19 sessions of therapy are required for a 50% recovery rate using clinical significance methodology. This is certainly in line with our findings indicating that a rather small number of patients "recovered", according to the Jacobson and Truax criteria, despite the large rates of improvement. Thus, an interesting future study would involve randomizing or simply varying the number of sessions in SIDI and examining the effects on treatment response. Additionally, it may be worthwhile to examine whether the effect of SIDI is specific (working only to reduce distress intolerance and treatment dropout), or general. That is, it is conceivable that SIDI also has beneficial effects on other maladaptive behaviors (e.g., aggression, self-harm, risky sexual behavior). Finally, studies could extend outcome measures to include abstinence/relapse. Each of these investigations would, of course, have to take place after the main effects of the current study are stabilized through larger sample size.

Summary

In conclusion, previous studies have found that inner-city drug users presenting with deficits in distress tolerance are likely to drop out of residential substance use treatment (Daughters et al, 2005). Moreover, deficits in distress tolerance, and its theoretical correlate, experiential avoidance, are related to a number of other negative consequences, included but not limited to generalized anxiety disorder (Roemer & Orsillo, 2002), antisocial (Daughters et al, in press), and borderline personality disorders (Bornovalova et al, 2007; Gratz et al., 2006). As such, there is a clear need for the development of brief and targeted treatments that aim to improve distress tolerance.

The current study found that a brief treatment, SIDI, is superior to SC and TAU in improving distress tolerance and decreasing experiential avoidance among inner-city drug users, a sample that is at risk for various psychopathology and problem behaviors. Further, despite the small sample size, a considerable proportion of those in SIDI reached clinical improvement on measures theoretically related to distress tolerance, with this difference emerging as significant on the measure of affect regulation expectancies. Finally, despite a lack of statistical significance (likely due to the small sample size), it should be noted that individuals in SIDI were more likely to complete residential substance use treatment than those in the comparison conditions. Thus, the current study lays the groundwork for a well-specified and novel behavioral distress tolerance treatment for individuals in substance abuse treatment.

From a longer term perspective, the current findings are useful for the continued development of this specialized treatment for vulnerable individuals. A more proximal goal is to establish its efficacy in a more large scale trial with a focus on long term substance use outcomes. If successful, this efficacy work could then be used to establish

effectiveness by extending the treatment in ways that are consistent with real world treatment demands including the provision of the treatment by counselors already in the these treatment centers. In this way, the ultimate goal of this work is to evaluate the clinical and public health significance of SIDI as a treatment that can work in the real world to improve substance use treatment outcome via attention to emotion-based potential barriers such as distress intolerance. Because inner-city drug users are at risk for multiple other negative health behaviors and consequences (e.g., HIV infection), such work also may have additional public health significance, as the prevention of dropout and relapse may have beneficial effects in terms of preventing and reducing HIV risk behavior (e.g., “dirty” needle use, exchange of sex for drugs/money).

Appendices

Appendix A: Predictors of Residential Treatment Dropout

In an effort to understand why substance-using individuals drop out of treatment, researchers have identified several major correlates of treatment completion and dropout, including, psychiatric symptoms/Axis I and II psychopathology (Greenberg, Otero, & Villanueva, 1994; Hattenschwiler, Ruesch, & Modestin, 2001; Linehan et al, 1999; Martinez-Raga et al, 2002), drug use severity (Ravndal & Vaglum, 1991), treatment motivation (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003; Hutchison, 1996; Simpson, Joe, & Rowan-Szal, 1997), drug court status (Collins & Allison, 1983; Lawental, McLellan, & Grissom, 1996), and therapeutic alliance (Horvath & Symonds, 1991; Martin et al, 2000). The following section briefly reviews the evidence for (and often against) each of these variables.

Comorbidity across Axis-I Psychopathology

A number of studies suggest that levels of psychiatric comorbidity are associated with dropping out of substance abuse treatment (Bell, Atkinson, Williams, Nelson, & Spence, 1996; Brown et al., 1998; Hattenschwiler, Ruesch, & Modestin, 2001; Lang & Belenko, 2000; Ravndal & Vaglum, 1994). For instance, Hattenschwiler, Ruesch, and Modestin (2001) compared four groups of substance abusing residential patients with differing psychiatric comorbidity. Findings indicated that those with substance dependence and comorbid affective disorders had a higher probability of relapse during their hospital stay as well as a higher probability of discharge against medical advice (treatment dropout). Lang and Belenko (2000) examined a number of predictors of

treatment dropout in a residential substance abuse treatment alternative to prison program. Results indicated that individuals who dropped out of treatment were four times more likely to have a psychiatric history than completers. Additionally, dropouts reported significantly more psychological problems with depression, anxiety, and controlling violent behaviors. Third, Bell et al (1996) measured levels of emotional functioning (i.e., self esteem, depression, and anxiety) during intake for individuals entering a 30-day residential substance abuse treatment facility. Results of this study indicated that compared to the treatment completers, dropouts had significantly higher levels of pretreatment anxiety and depression. Furthermore, decreases in levels of depression during the first two weeks of treatment was predictive of completing treatment, such that individuals who demonstrated decreases in depression were more likely to stay in treatment while those individuals who did not show improvements were more likely to dropout (see also Ravndal & Vaglum, 1994 for similar results). In contrast, however, Greenberg, Otero, & Villanueva (1994) found no evidence for the relationship between Axis I disorders and treatment dropout.

Co-morbidity across Axis-II Psychopathology: Personality Disorders

In addition to Axis-I symptomology and diagnoses, chronic personality disturbances with an emphasis on borderline and antisocial personality disorders also may interfere with one's ability to complete treatment. With regard to antisocial personality disorders, the findings are rather consistent. For example, residents of a long-term residential treatment facility were assessed on neurocognitive and personality functioning (Fals-Stewart & Lucente, 1994). Findings indicated that individuals with elevated scores on the antisocial personality scale of the Millon Clinical Multiaxial

Inventory stayed in the program a shorter amount of time and were removed for rule violations significantly more often than the other residents. Similarly, Fals-Stewart (1992) reported that substance abusing patients with MCMI-II antisocial and avoidant profiles had shorter treatment durations in long-term residential treatment than patients with other elevated profiles. Finally, Sheppard, Smith, and Rosenbaum (1988) reported that in a sample of alcoholic men in a residential alcoholism treatment program, those who dropped out scored significantly higher on scales of the Minnesota Multiphasic Personality Inventory, suggesting the presence of antisocial characteristics such as poor impulse control, interpersonal difficulties, and conflicts in relation to authority figures.

Similarly, quite a few studies have shown that substance users with Borderline personality disorder are at a high risk of premature treatment termination. For instance, Martinez-Raga and colleagues (2002) compared characteristics of individuals who completed treatment or dropped out of an inpatient drug- and alcohol treatment center, with findings indicating that the presence of a BPD diagnosis was significantly and independently related to treatment termination. In a study examining the impact of personality disorders on the efficacy of substance use treatment, Marlowe, Kirby, Festinger, Husband, and Platt (1997) found that a BPD diagnosis accounted for 44% of the variance in weeks of enrollment in treatment and 31% of the variance in the number of individual counseling sessions attended. Chiesa, Drahorad, & Longo compared drop-outs and those continuing treatment on demographic and clinical variables. Most notably, results showed that, although number of personality disorders did not predict dropout status, the presence of BPD did. Finally, Linehan and colleagues (1999) found that

treatment dropout rates ranged up to 73% among BPD individuals receiving “treatment-as-usual” for substance use.

Substance Use Severity

Evidence has pointed towards a positive relationship between higher levels of substance use, number of different substances used, and dropping out of treatment (Gainey, Wells, Hawkins, & Catalano, 1993; Kleinman et al., 1992; Stark, 1992; Westreich, Heitner, & Cooper, 1997). Recently, Maglione, Chao, and Anglin (2000) compared characteristics of methamphetamine users in residential treatment who completed at least 90 days of treatment versus those who left before 90 days. Individuals who reported more severe substance use, measured by frequency of use and route of administration, were significantly more likely to drop out of treatment. Specifically, only 26.1% of daily methamphetamine users completed 90 days of treatment, compared to 38.0% of those who used less than daily, and only 23.9% of injection users completed the 90 day threshold compared to 32.8% of non-injectors. Finally, Ravndal and Vaglum (1991) examined the predictors of treatment completion among adult substance abusers entering residential treatment. Substance use frequency was positively related to treatment dropout.

Treatment Readiness and Motivation for Change

Motivation has been found to predict both dropout and engagement in community-based treatment of substance abuse (De Leon & Jainchill, 1986; De Leon, Hawke, Jainchill, & Melnick, 2000; Simpson, Joe, & Rowan-Szal, 1997) across treatment settings (Joe, Simpson, & Broome, 1998). In a representative study, Joe, Simpson, and Broome (1998) examined client motivation as a predictor of dropout and engagement in therapy in a large (n = 2265) study. Treatment readiness significantly predicted 90-day dropout in long term residential treatment. In a parallel line of research, investigators

using the Transtheoretical Model of change (TTM) have reported similar findings. In brief, within this model, behavior change is conceptualized as a process that unfolds over time and involves progression through a series of six stages: precontemplation, contemplation, preparation, action, maintenance, and termination. According to the model, at each stage of change, different processes of change optimally produce progress. Although a discussion of the full model is beyond the scope of this paper, it is important to understand that a shift in decisional balance (“pro” to “con” ratio) is an important factor by which substance users become more motivated to quit (e.g., Prochaska, Norcross, & DiClemente, 1994).

The available evidence suggests that indeed, the said ratio is a predictor of motivation for behavior change (e.g., Share, McCrady, & Epstein, 2004). Further, King, Marcus, Pinto, Emmons, and Abrams (1996) found that among others, decisional balance was a mediator between stage of change and reduction in tobacco use. Finally, although not directly evaluating the role of decisional balance, two studies have suggested that one’s stage upon entering treatment is a robust treatment dropout (Brogan, Prochaska, & Prochaska, 1999; Prochaska et al., 1992). For instance, Brogan and colleagues (1999) found that decisional balance for therapy is an excellent predictor of treatment continuation, and along with other variables, has a 92% accuracy in predicting group status (premature terminators versus therapy continuers).

Despite supportive findings, contrary findings also have been provided (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003; Hutchison, 1996; Willoughby & Edens, 1996). For example, Blanchard, Morgenstern, Morgan, Labouvie, and Bux (2003) examined the predictive validity of the stages of change constructs to

treatment outcome in a sample of treatment seeking substance users. Stages of change (treated as a dichotomous variable comprised of membership in several change categories) did not predict treatment dropout. Nor did they predict other outcome variables, including percent days abstinent, and negative consequences of substance abuse at the end of treatment.

Drug Court Status

A number of studies have shown that individuals who come to treatment through drug courts, or said otherwise, are court mandated to treatment may be more likely to comply with and complete treatment to avoid being sent back to prison (Marlowe et al., 2001). For instance, Maglione, Chao, and Anglin (2000) found that individuals who are court mandated to treatment are somewhat more likely to comply with treatment programs and do just as well as patients who enter voluntarily. Similar results have been reported by a number of others (Collins & Allison, 1983; Lawental, McLellan, & Grissom, 1996; Ouimette, Finney, & Moos, 1997; Weisner, 1990).

Therapeutic Alliance

Therapeutic alliance, defined broadly as the collaborative and affective bond between therapist and patient (Bordin, 1979), has long been recognized as a robust predictor of outcomes in clients presenting with a variety of disorders. Indeed, research indicates that the absence of a strong early alliance is a good predictor of premature termination (Kokotovic & Tracey, 1990), and two meta-analyses from the past fifteen years have indicated that therapeutic alliance is associated with treatment dropout (pooled effect sizes = .26 and .22, respectively; Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000). Studies specific to substance use literature have indicated positive

associations between treatment completion and therapeutic alliance as rated by the client (Barber et al., 1999; Barber et al., 2001; De Weert-Van Oene, De Jong, Jorg, & Schrijvers, 1999; De Weert-Van Oene, Schippers, De Jong, & Schrijvers, 2001) therapist (Petry & Bickel, 1999; Meier, Donmall, Barrowclough McElduff, & Heller, 2005), or observer (Fenton, Cecero, Nich, Frankforter, & Carroll, 2001), and a recent review has concluded that early therapeutic alliance is a consistent predictor of engagement and retention in drug treatment (Meier, Barrowclough, & Donmall, 2005; Meier et al., 2005). This variable is perhaps the most robust out of all reviewed in the current section; as such, the measurement and statistical control of it is necessary for accurate interpretation of a given treatment study's results.

Appendix B: Residential Substance Use Treatment

Residential drug treatment facilities (including both short- and long-term ones) provide individuals with 24-hour supervised drug treatment in a controlled environment. Short-term residential (STR) programs are generally 30 days in duration, and focus on medical stabilization, abstinence, and lifestyle changes (Flynn et. al., 1997). STR programs include free-standing nonprofit and for-profit short-term programs, public and nonprofit hospital programs, and county-managed programs. In contrast, long-term residential (LTR) programs offer drug-free treatment in a residential setting, with planned stays ranging from 90 days to 2 years. LTR programs include traditional therapeutic communities (TCs), modified therapeutic communities, relapse prevention/health education programs (RP/HE) and other programs requiring in-residence treatment (Flynn et. al., 1997).

Short-Term Residential Treatment

STR programs were developed during the early 1980s to guide alcohol abusers through the first phases of the 12 steps of the Alcoholics Anonymous (AA) recovery process and to encourage involvement in AA groups after inpatient stay (Laudergan, 1982). The acute rise of cocaine use during the 1980s led to the expansion of STR facilities to include treatment for other illicit substances including cocaine (Cook, 1988). Effectiveness studies have shown mixed results, however. For instance, results from 1-year follow-up study examining STR treatment outcomes in 12 STR centers from across the U.S. indicated a 44% reduction of cocaine use, a 19.8% reduction in marijuana use, and a 28.4% reduction of alcohol use. There was only a 4.8% reduction in heroin use; however, it should be noted that heroin use at admission was only 7%. Although the large

overall sample size for this study provides a great deal of power (admission sample size = 2,613), the fact that only 30% of the original subjects provided 1-year follow-up data makes it difficult to draw definitive conclusions (sample size at follow-up = 799). At the 5-year follow-up of the same sample, overall substance use reductions were as follows: 45.5% in cocaine, 20.2% for marijuana, 34.8% for alcohol, and 4.8% for heroin (Hubbard, et al, 2003). The sample size for the 5-year follow-up was 226 (8% of the original sample). Again, the exceedingly small percentage of subjects providing 5-year follow-up data makes definitive conclusions difficult to make. Finally, the Drug Abuse Treatment Outcome Study (DATOS) found that clients entering STR programs reported significant reductions in cocaine, marijuana, and alcohol use. In sum, the authors argue that treatment had a positive effect for a large portion of individuals receiving long term residential, outpatient, and short term inpatient treatments; however, as above, a large percentage of the initial sample dropped out of treatment within one week. Thus, the positive findings were likely inflated, as treatment completer rather than intent-to-treat analyses were utilized in this study.

Long-Term Residential Treatment

Long-term residential (LTR) programs offer drug-free treatment in a residential setting, with planned stays ranging from 90 days to 2 years. LTR programs include traditional therapeutic communities, modified therapeutic communities, and relapse prevention/health education programs (Flynn et. al., 1997). TCs are believed to be the most common form of residential drug-free treatment (McCusker, et. al., 1997).

Historically, TCs were developed to treat severely dependent heroin addicts; however, in the 1980s, the rise in cocaine misuse and dependence has led to an expansion of

services. Indeed, a current TC generally provides treatment for a full range of substance use disorders. The goals of such programs is to "rebuild" the client and develop responsible drug-free lifestyles through a program of group living with firm behavioral norms and a hierarchical system of responsibilities and privileges. Therapeutic communities, in general, provide, in addition to safe accommodations and twenty-four hour care, a highly structured environment with set rules and timetables. Within this environment relationships are established and meetings occur in a manner that provides a safe emotional container for distress. Residents generally play an active role in the decisions that affect them, which may include voting on the admission and discharge of other residents, allocating daily domestic tasks to all members of the community, and holding members accountable for the breaking of rules.

Despite this general overarching framework for TCs, there is great variability in recommended length of stay, staff-to-client ratios, and training of staff in TCs. A point of agreement across TC communities, however, is the general TCs philosophy which views drug abuse as a reflection of an impeded personality development or chronic social deficit. In modified TC programs, the TC methodology is adapted to the fit needs of a specific population (e.g., prison inmates, the severely mentally ill, homeless, veterans, and the elderly; Burling, Seidner, Salvio, & Marshall, 1994).

Yet another form of LTCs are relapse prevention/health education (RP/HE) programs that stem from a cognitive-behavioral framework (Goldstein, et al 2001). In general, this form of treatment focuses on the client as the primary agent of change, and addiction is regarded as a maladaptive strategy for coping with stress that has become ingrained due to its association with immediate gratification (Marlatt, 1985). In RP/HE

treatment, clients are taught to identify cues, triggers, and emotional states that may lead to substance use, and implement specific cognitive and behavioral coping skills to prevent drug use in those situations. Similarly, clients are taught to develop strategies for avoiding situations that place them at high risk for substance use (Gordon, & Marlatt, 1981; Marlatt, 1985). The ultimate goal of treatment is total abstinence; however, RP/HE programs anticipate lapses and therefore integrate strategies that clients can apply in order to prevent “slips” or lapses from becoming full relapses to baseline or from leading to higher levels of substance consumption (Gordon & Marlatt, 1981). Clients are thus taught to regard lapses as opportunities for learning and improving their coping skills rather than as failures (Goldstein, et. al, 2001). The length of RP/HE programs varies, but generally ranges from 3-6 months.

Regarding efficacy data for LTR treatment, several studies are available. First, an intensive, 19-site LTR treatment outcome study was conducted by Hubbard and colleagues as part of DATOS in order to examine the effectiveness of various types of drug abuse treatments. Results from 1-year follow-up study examining LTR treatment outcomes indicated an 11.4% reduction of heroin use, a 44.2% reduction in cocaine use, a 15.6% reduction in marijuana use, and a 21.4% reduction of alcohol use. At the 5-year follow-up of the same sample, overall substance use reductions were as follows: 7.6% for heroin, 39.4% in cocaine, 22.1% for marijuana, and 8.2 for alcohol (Hubbard, 2003). Although these results are encouraging, similar to work reviewed above, this particular study evidences some methodological constraints. Specifically, the extremely high attrition rate (70.5 % at one year follow-up) precludes definitive conclusion regarding the efficacy of this modality.

In a similar study, Ravndal and Vaglum (2002) assessed individuals 5 years after entering LTR treatment. Of the 200 individuals receiving an intake evaluation, 144 entered the program; 30% completed the inpatient phase and 20% completed the entire program. At the five-year follow-up point, 89.5% of the original 200 subjects were available for inclusion in the analyses. In the year prior to follow-up, 20% of the sample reported abstinence or light use, 25% reported moderate use, and 56% reported heavy use. As levels of pre-treatment use were not reported, improvement is difficult to interpret. This study represents one of the few 5-year follow-ups of individuals receiving inpatient drug treatment and suggests a high rate of relapse even following long-term intensive inpatient treatment.

Finally, a study by McCusker and colleagues (1997) compared RP/HE and TC drug treatment. Follow-up data indicated that 18% of the subjects in the RP/HE group reported that they were abstinent. Twenty-two percent of the subjects in the TC group reported that they were abstinent. It should be noted that both groups reported significant reductions on the drug composite score of the addiction severity index; however, change scores were not significantly different across groups. This study suggests that these two treatment modalities are comparable in terms of treatment outcome. Further, it suggest that although both treatments are effective in reducing drug use, considerably more longitudinal research is required in order to determine the underlying mechanisms that lead to increased across programs.

Footnotes

¹ Please see Appendix A for a review of the relationship between these covariates and treatment dropout.

² It should be noted the analyses were replicated across four groups, including a group that did not qualify due to having high levels of distress tolerance. First, after the addition of the fourth, non-qualified group to the general chi-square analysis examining dropout status across the 30-day ($\chi^2 = 6.28, p < .10$) and all ($\chi^2 = 3.35, p < .34$) rendered the entire chi-square non-significant, as those in the “non-qualified group were dropping out at the same, or slightly higher rate as those in the TAU condition. When all four groups were used in a Cox regression (for dropout throughout the entire contract length), condition remained non-significant.

Table I. Demographic Questionnaire and Treatment History and Legal Status
Means and standard deviations of demographic variables, treatment history, and drug court status among the entire sample as well as group differences between dropouts and completers.

	Overall	SIDI	SC	TAU	Statistic
Age	43.51 (9.8)	44.86 (9.81)	41.05(7.66)	44.96(10.55)	F= 1.65; p = .2
Total Household Income	23,300 (29,900)	26,000 (28,400)	21,300 (24,000)	21,800 (35,500)	F = .18; p = .83
Gender (% Male)	79.4	81.8	63.2	88.5	$\chi^2=4.4$; p = .12
Ethnicity (% African American)	90.1	90.1	89.5	91.7	$\chi^2=.06$; p = .98

Marital/Relationship Status (% Single)	71.6	59.1	78.9	76	$\chi^2=2.9$ p = .23
Education Level					$\chi^2=5.21$; p = .28
Some High School	35.8	31.8	42.1	32	
High School Graduate/GED	34.3	27.3	47.3	32	
Some College/Technical School/College Graduate	30	40.1	10.5	36	
Attended SUD Treatment in the Past (% endorsing “yes”)	77.9	78.9	80	73.1	$\chi^2=.55$; p = .71
Court Mandated to TX	61.8	54.5	63.2	65.4	$\chi^2=.72$; p = .63
Mean Contract Across Groups	62.77 (45.23)	61.36 (42.91)	71.67 (52.61)	57.60 (42.36)	F(2, 60) = .37; p = .69
Modal Contract Across Groups	30	30/60	60	30	$\chi^2=2.40$; p = .88

Table II. Percentage of sample meeting diagnostic criteria for DSM-IV Axis I and select Axis II Disorders** and percentage of sample currently receiving psychotropic medication

Diagnosis	Overall	SIDI	SC	TAU	χ^2
Bipolar I or II	13.4%	22.7	5.2	12	2.73 p = .26
MDD	26.9%	40.9	26.3	16	3.67; p = .18
Past MDD	35.8%	50	26.3	.32	2.80; p = .26
Social Phobia	10.4%	13.6	10.5	8	.39; p = .84
Generalized Anxiety Disorder	13.4%	27.3	10.5	4	5.6; p = .06
Post-Traumatic Stress Disorder	14.9%	18.2	21.1	8	1.66; p = .46
BPD	26.9%	50	10.5	20	9.08; p < .01**
APD	37.3%	36.4	40	36	.09; p = .96
Substance Dependence					
Alcohol	32.4	40.9	36.8	24	1.65; p = .5
Cannabis	10.4	9.1	15.8	4	1.82; p = .43
Heroin	29.9	40.9	31.6	20	2.44; p = .34
Cocaine	58.2	59.1	68.4	52	1.20; p = .48
PCP	7.5	4.5	10.5	8	.53; p = .77
Dependent \geq one drug class	41.8	50	52.6	28	3.46; p = .18
Receiving Psychotropic Medication	13.2	13.6	10.5	12	.10; p = .95

** Only includes disorders for which at least 5% of sample met criteria

Table III. Group differences on potential clinical and therapy-related covariates

	SIDI		SC		TAU		Statistic
Measure	Mean	SD	Mean	SD	Mean	SD	
<i>Z-Score Addiction Severity</i>							
Physical	.11	.94	-.10	.96	-.10	.96	F = .26; p = .75
Interpersonal	-.10	.79	-.03	1.09	-.08	.9	F = .03; p = .97
Psychological	.24	1.1	-.01	.98	-.09	1.0	F = .64; p = .53
Legal							
<i>Treatment Motivation (SOCRATES)</i>							
Recognition	31.61	4.60	29.23	45	29.23	6.85	F = .12; p = .31
Ambivalence	13.54	4.5	13.06	3.36	13.97	3.21	F = .32; p = .72
Taking Steps	33.36	5.33	34.83	4.38	32.42	7.14	F = .29; p = .42
Total	77.09	10.71	78.88	7.81	75.62	15.41	F = .49; p = .612
<i>Therapeutic Factors</i>							
CALPAS-Brief	92.46	10.56	90.03	10.56	N/A	N/A	F = .5; p = .48
Program Satisfaction	90.45	13.27	87.37	16.61	90.83	16.21	F = .31; p = .73

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

	α	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
<i>Demographics</i>	Pre Post	Pre only	Pre only	Pre only	Pre only	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post
1. age	N/A	-.08	.230	.06	-.07	.02	N/A	N/A	.02	-.01	-.05	-.10	.02	.14	.08	.09	-.06
2. gender	N/A	-.13	.00	-.150	-.011	-.30*	N/A	N/A	-.28*	-.13	.10	-.00	.02	-.08	.18	.10	-.02
3. Race	N/A	-.17	-.22	-.15	-.10	-.32*	N/A	N/A	-.18	.04	.05	-.17	-.09	-.01	-.06	.01	-.13
4. Marital Status	N/A	.14	-.17	-.05	.03	.08	N/A	N/A	-.16	-.10	-.12	.01	.31*	.03	-.09	.00	.09
5. Income	N/A	-.26*	.21	.13	-.02	-.07	N/A	N/A	-.21	-.02	.27*	-.10	-.15	.06	.17	-.12	-.00
6. educate	N/A	.16	-.05	-.09	-.11	.053	N/A	N/A	.045	.10	.10	-.10	.04	.08	.21	.10	-.02
7. SOCRATES (Total Score)	.86	--	.11	.18	.10	.28*	N/A	N/A	.11	.15	-.05	-.03	.13	.12	-.05	-.05	.07
8. Addiction Problems (Medical)	.88		--	.51**	.55**	.236	N/A	N/A	.224	-.41**	-.30*	.29*	.082	.028	-.17	-.14	-.10
9. Addiction Problems (Psychological)	.70			--	.60**	.53**	N/A	N/A	.28*	-.29*	-.25	.29*	.22	.08	-.01	-.20	.19
10. Addiction Problems (Interpersonal)	.82				--	.288*	N/A	N/A	.311*	-.48**	-.42**	.306*	.246	.054	-.13	-.20	.06
11. CESD-Pre	.76					--	N/A	N/A	.47**	-.36**	-.44**	.49**	.34**	.20	-.01	-.04	.16
Post	.76					.50**	-.23	-.03	.48**	-.41**	.56**	.56**	.37**	.05			
<i>Therapeutic Variables</i>																	
12. CALPAS	.93						--	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.17	.11	.11
							--	.19	-.21	.23	.02	.11	-.18	-.02			

13. Tx Satisfaction	N/A							--	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-11	.03	.03
								---	-.02	-.10	.03	-.001	-.01	.12					
Social-Cognitive Predictors/Outcomes																			
14. Disengagement Coping (pre)	.81							--	-.20	-.59**	.34**	.21	.22	.10	.07	.01			
post	.82							.50**	-.23	-.37**	.51**	.04	.24	-.11	.01	-.16			
15. SCQ-pre	.89							--	.51**	-.47**	-.39**	-.14	-.08	.13	-.06				
post	.88							.35**	.48**	.38**	-.37**	.03	-.15	.11	-.32*				
16. NMRE-Pre	.77							--	-.52**	-.20	-.33*	-.10	.27*	-.11					
post	.87							.59**	.69**	.44**	-.07	.05	.05	-.30*					
Experiential Avoidance and Distress Tolerance																			
17. DERS-Pre	.89										--	.41**	.06	.04	-.16	.18			
post	.94										.67**	.42**	.17	-.05	-.04	.18			
18. aaq16pre	.63											--	.18	.24	-.05	.26*			
post	.76											.52**	.04	-.12	-.02	.20			
19. DT tasks # Quit-Pre	N/A												--	.53**	-.00	.04			
post													.14	-.76**	.13	.02			
20. DT tas # quit change (pre to post)	N/A														---	-.20	.01		
21. Days missing before completion of 30 day contract	N/A															---	.12		
22. Days missing before completion of contract (any length)*	N/A																---		

*Note: Double correlation values and line separating cells indicates a variable measured at pre and post both; absence of a line through the cell indicates that either the variable had only one assessment (and thus, there is no need for repeated correlational analyses, or that there is only one possible value for the variable.

Table V. Pre and post-test raw scores between groups.

Statistic and effect size on the right represents time by condition interaction effects from repeated measures ANOVAs, without controlling for BPD.

SIDI			SC		TAU		Statistic	Effect Size
Measure	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)	Pre M (SD)	Post M (SD)		
Depression and Social-Cognitive Outcomes								
CES-D	11.14 (5.8)	8.20 (5.12)	12.13 (5.32)	9.63 (4.37)	10.82 (5.08)	9.91 (5.79)	$F(2, 60) = 1.0$, $p = .39$.03
Disengagement Coping	.16 (.92)	-.0735 (1.03)	-.10 (.85)	-.15 (.82)	.01 (1.13)	.17 (1.15)	$F(2,60) = 0.79$, $p = .46$.03
SCQ	59.85 (20.17)	75.80 (19.17)	54.30 (26.04)	69.41 (23.17)	63.91 (28.58)	71.82 (19.89)	$F(2,61) = 0.84$, $p = .44$.03
NMRE	100.48 (13.29)	111.72 (15.08)	97.56 (12.89)	102.89 (20.08)	105.78 (12.79)	106.72 (11.51)	$F(2,55) = 2.73$, $p = .07$.09
Experiential Avoidance and Distress Tolerance								
DERS-Total	85.45 (16.98)	81.55 (18.40)	87.11 (26.10)	84.37 (29.00)	78.97 (25.11)	80.36 (23.64)	$F(2,61) = .68$, $p = .52$.01
AAQ16	71.73 (9.09)	62.91 (9.60)	70.54 (11.10)	68.67 (13.84)	72.72 (10.58)	69.94 (8.08)	$F(2,56) = 3.23$, $P < .05$.10
Tasks # quit	1.86 (.36)	1.19 (.75)	1.68 (.48)	1.79 (.54)	1.45 (.60)	1.50 (.61)	$F(2,58) = 7.5$, $p < .001$.21

Table VI. Improvement, normative functioning, and change across groups according to Jacobson and Truax criteria.

Measure	SIDI					SC				TAU		
	% Deterior.	% No Change	% Improved	% Recov	% Deterior.	% No Change	% Improved	% Recov	% Deterior.	% No Change	% Improved	% Recov
Depression and Social-Cognitive Outcomes												
CES-D	0	57.1	42.9	0	0	77.7	22.2	0	0	78.3	21.7	0
Disengage Coping	9.1	63.6	22.7	4.5	21.1	47.4	31.6	0	21.7	73.9	4.3	0
DERS	4.5	86.4	9.1	0	5.2	84.2	22	0	15	78.9	5.3	0
SCQ	0	68.2	22.7	9.1	0	57.9	36.8	5.3	0	60.9	39.1	0
NMRE	0	54.5	40.9	5	0	83.3	11.1	5.5	0	89.5	10.5	0
Experiential avoidance												
AAQ	0	59	31.8	9.1	0	83	16.6	0	0	89.5	10.5	0

*Note: Recovered = individual has passed the normative cutoff and RCI in the positive direction; improved = has passed RCI in the positive direction but not the normative cutoff; unchanged = has passed neither criterion; deteriorated = has passed RCI in the negative direction.

Figure I: change on Distress Tolerance tasks as a function of group

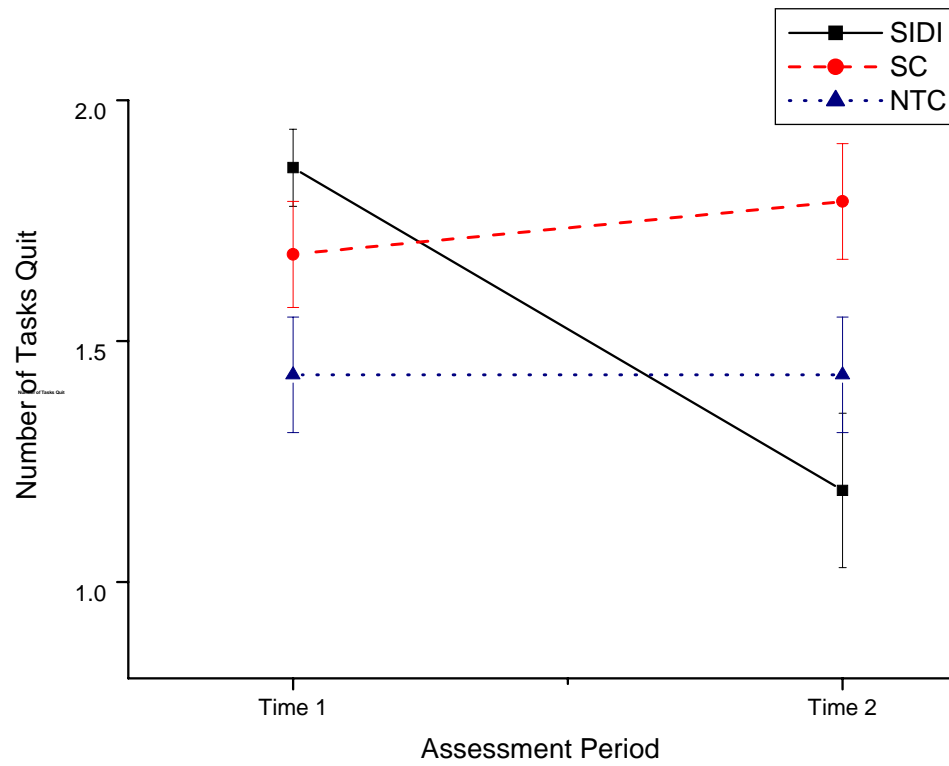


Figure II: Change on AAQ as a function of group

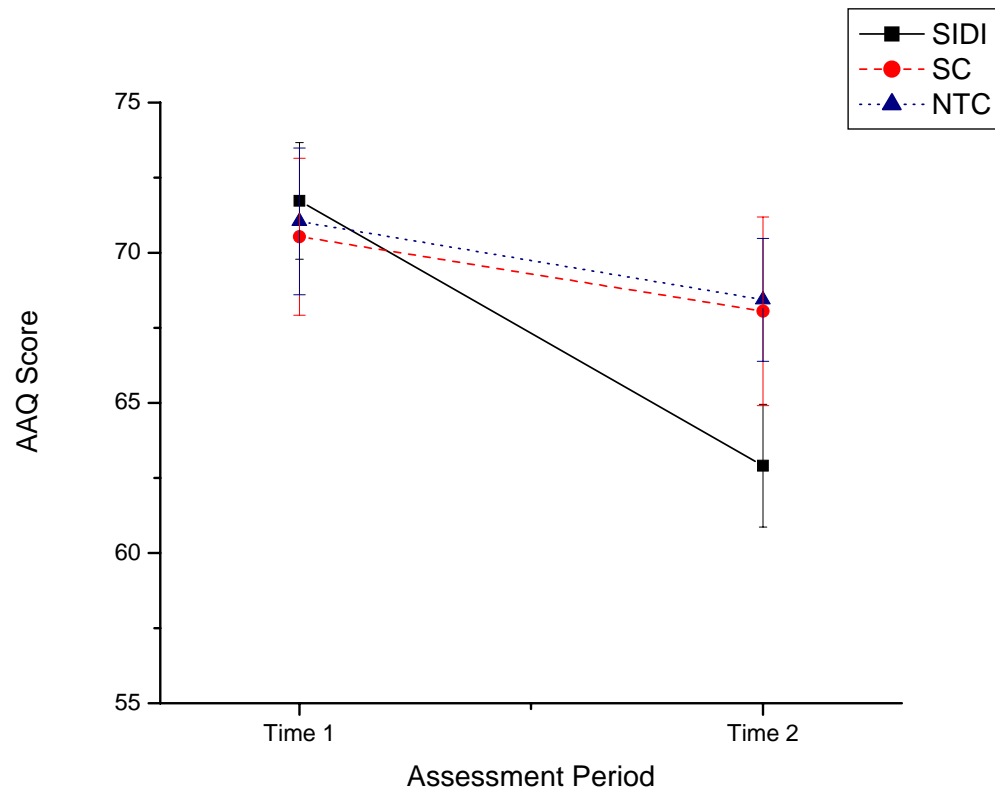
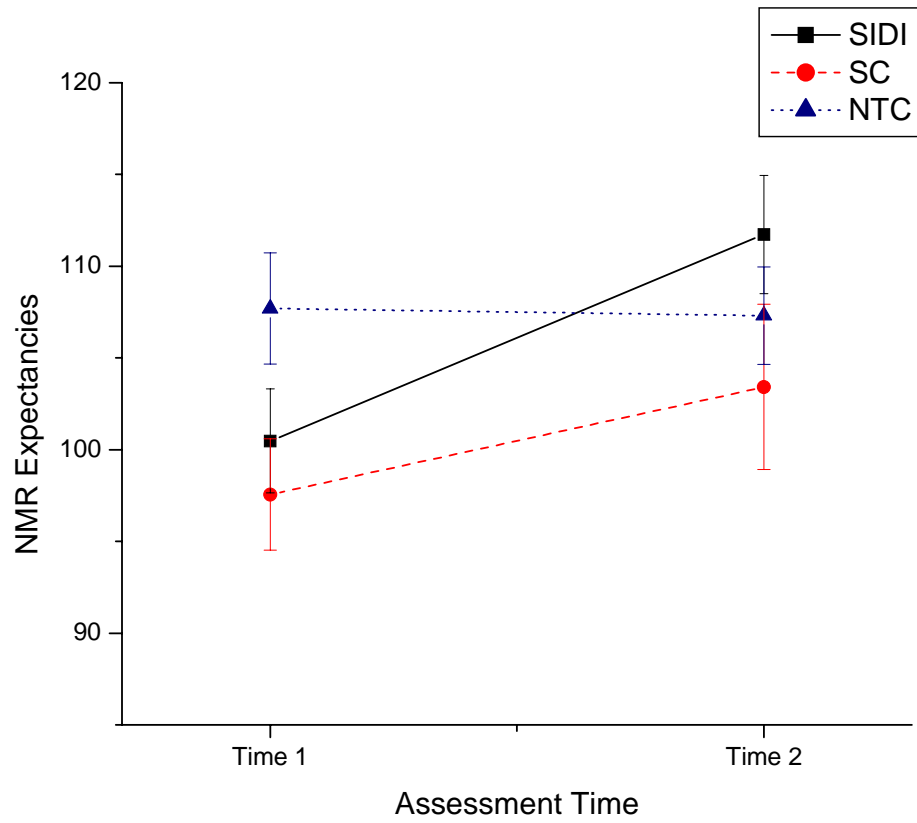


Figure III: Change on NMR as a function of group.



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