The Effects of Electronic Treatment Reminder Cues on Relapse Prevention

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Dedication

This Dissertation is gratefully dedicated to my husband, Brian Echeverry, without whose support this project, or my educational endeavors, would not have been feasible. With his never relenting sacrifices of his career, goals, and dreams, my own have become a reality. It will be an honor to repay the favor.

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Abstract

Substance use is highly prevalent in the United States, and although treatments designed to reduce substance use have shown promise, relapse rates between 40% and 70% following treatment have been reported in recent studies. Given the high rate and chronicity of relapse following substance abuse treatment, conducting research aimed to develop techniques to lower the risk of relapse following treatment is imperative. A promising option to reduce relapse is to use treatment reminder cues, or cues that are salient features of the treatment environment that can be used to extend the effects of treatment into non-treatment settings. This study investigated the effects of treatment reminder cues on rates of relapse in 50 male and female individuals entering intensive outpatient treatment for substance abuse. It utilized a one-month randomized and controlled design using state-of-the-art electronic handheld computer technology. Participants in the experimental condition were prompted to read and respond to four treatment reminder cues per day in addition to one daily diary survey assessing for a variety of proximal variables related to relapse. All participants were asked to complete assessment questionnaires of relevant variables that may affect relapse at baseline and 1-month follow-up. Chi-square tests were used to determine if adding treatment reminder cues to standard treatment resulted in less relapse relative to standard treatment alone, and whether onset occurred significantly later for those receiving treatment reminder cues. Binary logistic regression analyses investigated the extent to which compliance with treatment reminder cues was associated with relapse. Results indicated that twice as many individuals in the control group relapsed compared to the experimental group, which approached statistical significance. In addition, those in the experimental group relapsed substantially later than did those in the control group. Results indicated no effect of increased compliance on decreased relapse. Overall, this study holds the

promise of providing a simple, inexpensive, and effective strategy for attenuating rates of relapse or delaying the onset of return to use by extending the context of treatment beyond the immediate therapeutic setting. Clinical and research implications, and future directions for substance abuse research are discussed.

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Chapter 1

Introduction and Literature Review

Severity of Substance Use and Significance of the Problem

Substance use and abuse are highly prevalent in the United States and present major public health concerns. In 2012, the Substance Abuse and Mental Health Administration's (SAMHSA) National Survey on Drug Use and Health found that more than 52% of individuals 12 years and older reported having consumed alcohol during that year, that nearly one quarter of respondents indicated binge drinking within the last month, and that an additional 6.5% of respondents engaged in heavy alcohol use (SAMHSA, 2012). Furthermore, 9.2% of the population reported illicit drug use within the last month, of which the majority (63%) reported marijuana as their primary drug of choice (SAMHSA, 2012). Given the high prevalence in the population, it is not surprising that substance use disorders are among the most common of the psychiatric disorders (Kessler et al., 2005). SAMHSA estimated that in 2012, 8.5% of the population met diagnostic criteria for a substance abuse or dependence disorder. Of these, the majority (14.9 million individuals) were diagnosed with dependence or abuse of alcohol only. An additional 4.5 million were diagnosed with dependence or abuse of an illicit substance, and 2.8 million were abusing or dependent upon both alcohol and illicit drugs (SAMHSA, 2012). Most individuals with a substance abuse or dependence disorder (7.3 million people) reported marijuana as their primary drug, followed by pain relievers (2.1 million people), cocaine (1.1 million people), tranquilizers (630,000 people), stimulants (535,000 people), heroin (467,000 people), hallucinogens (330,000 people), inhalants (164,000 people), and sedatives (135,000 people; SAMHSA, 2012).

Not only do substance abuse and dependence disorders have high prevalence rates, but they are also associated with a host of co-morbid medical and psychological problems, including panic reactions, paranoia, delirium, depression, alterations in memory, difficulty paying attention, impaired executive functioning, employment and relational difficulties, suicide, and partner violence (see Leri, Bruneau, & Stewart, 2003; Sussman, Stacy, Dent, Simon, & Johnson, 1996 for reviews). Furthermore, the cost of substance abuse and addiction to society is substantial, and the National Institute of Health (NIH) estimates that substance related problems cost the United States over $559 billion dollars per year due to increased healthcare costs, crime, and lost productivity (NIH, 2004). Tobacco use accounts for the largest portion of this cost, at an estimated $193 billion/year, but is followed closely by alcohol related problems ($185 billion/year) and illegal drug use ($181 billion/year; NIH, 2004). In addition, alcohol-related accidents amount to a cost exceeding $100 billion per year. With regard to crime more specifically, the National Partnership on Alcohol Misuse and Crime (NPAMC, 2013) reported that almost 13,000 people are killed each year in an alcohol-related accident, that hundreds of thousands are injured, that nearly 1.4 million people are arrested for driving while intoxicated (DWI), of which 780,000 are convicted, and that, impressively, two-thirds of those sentenced for DWI are repeat offenders. Violent crimes are also often associated with alcohol use and 40% of convicted prisoners were under the influence of alcohol at the time of their offense (NPAMC, 2013). Statistics of the association between drug use and crime paints a similarly bleak picture. According to the Uniform Crime Reporting Program (UCRP), nearly 1.7 million drug related arrests were made in 2009 (NCADD, 2013). Additionally, 35% of prisoners in 2004 reported committing an offense to obtain money for drugs (Bureau of Justice Statistics, 2004), and in 2007, nearly 4% of homicides were narcotics-related (NCADD, 2013). Despite the staggering

negative psychological, social, relational, and legal consequences associated with substance abuse, of the 22.2 million individuals suffering from a substance abuse or dependence disorder in 2012, only 4 million sought substance abuse treatment. Of these, the majority received treatment for alcohol only, followed by treatment for both alcohol and drugs, and treatment for illicit drug use only (SAMHSA, 2012).

Compounding the issues highlighted above is the finding that some substance abusers continue illicit drug and alcohol use while undergoing substance abuse treatment. For instance, in a study of 100 participants in methadone treatment, results indicated that although alcohol use in this population decreased marginally, both the use of cannabis and the use of cocaine increased significantly, as did the use of non-prescribed methadone (Best et al., 2000). This finding is consistent with previous research that suggests that high rates of cocaine use are common in individuals undergoing heroin treatment (e.g., Grella, Anglin, & Wugalter, 1997; Magura, Kang, Nwakeze, & Demsky, 1998). Similarly, in a meta-analysis of the predictors of continued drug use during and after treatment for opiate addiction, researchers found that a high number of patients either relapsed following opiate treatment or continued drug use while in the therapeutic setting (Brewer, Catalano, Haggerty, Gainey, & Fleming, 1998). In a chart-review study of individuals attending inpatient substance abuse treatment, Greenfield, Weiss, and Griffin (1992) found that 42 of the 700 participants continued to use drugs while in treatment, and that the majority of these individuals had histories of either heroin or methadone abuse prior to treatment.

Risk of Relapse following Treatment

Coupled with the risk of continued use while in treatment, the exceedingly high rates of relapse following treatment are alarming. Although treatments designed to reduce substance use

have shown promise, studies estimate that between 40% and 70% of people relapse following treatment, and that 50% do so within the first six months (Dennis, Scott, & Funk, 2003; McKay & Weiss, 2001; Project MATCH Research Group, 1997), with an additional 40% cycling through periods of recovery and relapse (Scott, Foss, & Dennis, 2005). In an investigation of the rates and predictors of relapse, Moos and Moos (2006) found that short-term remission rates ranged from 20% to 50%. More specifically, Miller, Walters, and Bennett (2001) conducted a review of the effectiveness of alcohol treatment and concluded that after one treatment episode, one in four individuals abstained from further alcohol use during the first year post-treatment. In addition, one in ten reduced the frequency and quantity of their drinking but continued with some degree of use. Together, these cases accounted for approximately one third of individuals undergoing treatment. The remaining two thirds of treated individuals continued to engage in periods of heavy alcohol use. However, the authors noted that although these individuals continued to consume alcohol, they tended to do so at a frequency significantly less than prior to treatment, and drank fewer drinks per occasion. Alcohol related problems also decreased by 60% following treatment (Miller et al., 2001). Comparatively, approximately 5%-45% of untreated individuals are able to abstain from substance use on their own (Moos & Moos, 2006), although this number is inflated in some studies to upwards of 80% depending on the severity of the alcohol problem (Moos & Moos, 2006). In a meta-analysis comparing un-treated to treated individuals, Moyer and Finney (2002) found that the rate of abstinence for un-treated individuals was 21% compared to 43% for those who had undergone treatment. Similarly, Weisner, Matzger, and Kaskutas (2003) found that treated individuals had higher treatment outcomes than did untreated individuals (40% versus 23%).

Overall, research seems to suggest that treated individuals fare better than do those that do not seek substance use treatment (Moos & Moos, 2006). Research findings also suggest that time in treatment is a primary predictor of treatment success (Moos & Moos, 2006) and that patients who choose not to complete treatment or have shorter stays tend to experience higher rates of readmission (Moos, Pettit, & Gruber, 1995). Furthermore, drop-out rates are a significant concern during substance treatment, with approximately 10-30% of clients choosing to leave treatment before its completion (Rabinowitz & Marjefsky, 1998). Studies examining the factors associated with substance treatment drop-out have identified a number of important variables; including, younger age (Cahill, Adinoff, Hosig, Muller, & Pulliam, 2003), African American ethnicity (Milligan, Nich, & Carroll, 2004), less education (Siqueland et al., 1998), and unemployment (Mertens & Weisner, 2000). More drug use (Mertens & Weisner, 2000) and lower cognitive functioning (Erwin & Hunter, 1984), have also been identified as significant predictors of drop-out. A number of in-treatment factors are also important in predicting drop-out; including, therapeutic alliance and level of engagement in treatment (Joe, Simpson, Dansereau, & Rowan-Szal, 2001). The literature on predictors of relapse to substance use mirror the above findings and additionally highlight the role of increased interpersonal stress and rejection sensitivity (Leach & Kranzler, 2013), reduced coping skills (McKay, Franklin, Patapis, & Lynch, 2006), temptation to drink (Witkiewitz, 2013), and increased cravings and negative affect (Witkiewitz & Marlatt, 2004) in increasing the risk for relapse.

Theoretical Models of Relapse

An interesting line of research suggests that the high rates of relapse can be partially explained by the complexities inherent in the change process (Connor, Symons, Feeney, Young, & Wiles, 2007), and many models have been developed to identify and explain the predictors of

substance use relapse. These models can be classified into two broad groups; the psychological models of relapse, and the psychobiological models of relapse. The Psychological group is comprised of the cognitive-behavioral model (Marlatt & Gordon, 1985), the person-situation interactional model (Litman, 1986), the cognitive appraisals model (Sanchez-Craig, 1976), and the self-efficacy and outcomes expectations model (Annis, 1986; Rollnick & Heather, 1982; Wilson, 1978). The psychobiological models of relapse include theories examining the roles of opponent-process and acquired motivation (Solomon, 1980), craving and loss of control (Ludwig & Wikler, 1974), urges and cravings (Wise, 1988), withdrawal (Mossberg, Liljeberg, & Borg, 1985), post-acute withdrawal syndrome (Gorski & Miller, 1979), and withdrawal/limbic kindling (Adinoff, O'Neill, & Ballenger, 1995).

According to the Litman's person-situation model, the interaction of an individual's coping skills, their perception of the effectiveness of these coping skills, and the ability of these skills to mitigate a particular high-risk situation (e.g., negative mood, situations related to drinking, interpersonal anxiety, decreased cognitive vigilance, rationalization for drinking) is key to predicting and preventing relapse (Connors, Maisto, & Zywiak, 1996). More specifically, relapse is a process that happens within an individual as the interaction between the three aforementioned variables occurs. Relapse is therefore more likely to happen when an individual feels to be lacking necessary coping skills with which to handle a particular high-risk situation. In extension, those individuals who encounter more high-risk situations and possess the fewest adequate coping strategies are more likely to relapse (Connors et al., 1996).

The focus of the cognitive appraisals model is somewhat different in that the person's appraisal of the high-risk situation is deemed most critical (Sanchez-Craig, 1976). According to this model, the high-risk situation is not in and of itself a critical component to relapse; it is the

individual's interpretation of that situation that can lead to, or protect against, relapse (Connors et al., 1996). In essence, a person can evaluate a situation either negatively, positively, or neutrally. These perceptions may not be accurate and are subject to change as information becomes available. These appraisals can also be affected by the availability of coping resources, and a lack of coping strategies can lead to negative interpretations that are most predictive of relapse (Connors et al., 1996).

The self-efficacy and outcome expectations model is drawn from the work of Bandura (1977, 1982) and focuses on a person's belief about the most likely outcome of a behavior (outcome expectancies) and the evaluation of their ability to produce the behavior that will lead to a particular outcome (self-efficacy; Connors et al., 1996). Both positive and negative outcome and self-efficacy beliefs can affect the risk of relapse following treatment. For instance, an individual may believe that they are able to abstain from drinking (a positive self-efficacy belief), which may be countered by the belief that they will be unable to control their drinking following the first sip (a negative self-efficacy belief; Connors et al., 1996). Similarly, outcome expectancies can be both positive and negative, such that an individual may believe that abstinence will follow treatment (positive) but that a full blown relapse will occur if even one sip is taken (negative). The more the individual relies on the negative expectancies and beliefs and the less control that individuals feels to have, the more likely relapse is to occur (Connors et al., 1996).

Within the domain of psychobiological models, Solomon (1980) focused primarily on the role of opponent-process and acquired motivation on the risk for relapse. According to the opponent-process theory, when a person is exposed to a novel situation, the body acts to mitigate the effects of the new stimulation. This new stimulus triggers a process that leads to a particular

emotional state, but also triggers an opposing process that works to counteract the initial emotional state. The ending emotion that the individual experiences is the combination of these two processes (Solomon, 1980). Upon repeated exposure to the stimulus, the initial emotional process becomes weakened and the secondary and opposing emotional process becomes more dominant (Connors et al., 1996). When applied to substance use, the substance acts as the stimulus. The initial response process may include a feeling of relaxation and happiness, whereas the opposing process may include depression and irritability. For light drinkers, the effects of the initial emotional process last longer, while for heavy drinkers, the extinction of the initial emotional reaction occurs faster, causing the opposing emotional process to appear more quickly and more dominantly. In heavy substance users, either one of these processes can lead to relapse; the individual may seek to increase the positive emotions by engaging in more frequent substance use, or may drink to seek relief from the negative emotional states caused by the opposing process (Connors et al., 1996).

The carvings and loss of control model advocated by Ludwig and Wikler (1974) posits that internal and external cues can lead to cravings and, by extension, to relapse. Internal cues can include negative mood states as well as physical symptoms of substance withdrawal whereas external cues may include the availability of the substance or the occurrence of a stress-inducing situation (Ludwig & Wikler, 1974). The presence of these cues elicits cravings, which are seen as a ‘cognitive label’ for the physiological arousal resulting from the presence of the cues, and an individual’s appraisal of this arousal determines whether or not a ‘craving’ is present (Connors et al., 1996). If a ‘craving’ is experienced, a person may seek relief from this arousal by using the substance which may result in loss of control if that person were to be unable to interpret the interoceptive cues that would facilitate regulation (Ludwig & Wikler, 1974).

Similarly, Wise (1988) and Tiffany (1990) highlight the importance of cravings in their models of relapse. According to these models, automatic and non-automatic cognitive processing is critical in protecting against, or leading to, relapse (Connors et al., 1996). Automatic processes are those that control most of our daily lives and are developed through repeated practice. Most substance use behavior is controlled by these automatic processes (Tiffany, 1990). Cravings develop through the process of substance withdrawal, or through the positive reinforcing effects of the substance, and repeated exposure leads to automatic responding. Conversely, non-automatic processes require conscious effort and involve choosing between strategies, executing the chosen strategy, and maintaining the effects (Tiffany, 1990). As such, a substance user's ability to abstain from substances will be effortful since the automatic processes compel that individual to use, and efforts to abstain must be consciously and willfully made (Connors et al., 1996). For individuals in which non-automatic processing is absent or otherwise occupied, relapse becomes more likely.

Several models have also focused on the importance of withdrawal in initiating relapse. For instance, Mossberg et al., (1985) state that acute withdrawal is followed by 4-8 weeks during which many negative side effects are experienced (e.g., depression, loss of concentration, and anxiety). This period is followed by 1-3 weeks during which drastic mood changes occur and during which relapse is most likely (Mossberg et al., 1985). Similarly, Gorski and Miller (1979) focused their research on post-acute withdrawal syndrome and defined relapse as a "process that occurs within the patient which manifests in a progressive pattern of behavior that allows the symptoms of a disease or illness to become reactivated in a person that has previously arrested those symptoms" (Groski & Miller, 1979, p1). According to their theory, repeated consumption of a substance will lead it to have a normalizing effect on the person's body. Upon abstinence,

the body goes through a period of withdrawal. This withdrawal is followed by a period of up to 3 months during which 'post acute withdrawal syndrome' is experienced. This period is marked by a decrease in higher level cognitive functioning, periods of emotionality, and poor decision-making, including the decision to relapse (Connors et al., 1996). At a more molecular level, Adinoff et al. (1995) suggest that substance use potentiates the effects of the GABA neurotransmitter which results in neuron inhibition (Connors et al., 1996). Upon abstinence from the substance, the neuron becomes dis-inhibited leading to physiological changes associated with withdrawal. Repeated withdrawal leads to increased physiological changes and more severe symptoms. Over time, the individual experiences an effect called 'kindling' whereby the individual begins to develop spontaneous symptoms of withdrawal in response to a number of cues. The individual then experiences cravings and is motivated to use the substance to alleviate the symptoms of withdrawal (Adinoff et al., 1995).

One of the most widely accepted models of relapse and the most widely cited model to-date is the cognitive-behavioral model proposed by Marlatt and Gordon in 1985. The primary components of this model are the self-efficacy that develops as a result of abstinence and the availability of adequate coping resources. In other words, if an individual is unable to use effective coping methods during a high-risk situation, their sense of self-efficacy decreases and the attractiveness of substance use as a coping mechanism increases (Connors et al., 1996). More specifically, the initial act of abstaining from a substance is believed to engender a sense of efficacy and personal control, beliefs that become stronger as the period of abstinence increases. However, as the period of abstinence continues, an individual is likely to come in contact with increasingly more frequent high-risk situations. If the individual possesses adequate coping skills, they are able to effectively navigate these situations resulting in continued abstinence and

increased self efficacy (Bandura, 1977). However, if the individual does not possess adequate coping skills, they are likely to experience a reduction in self efficacy and will be more likely to turn to substances as an alternative coping mechanism (Marlatt & Gordon, 1985).

The origins of this model lie in a taxonomy of relapse situations developed by Marlatt and Gordon in 1980 (Witkiewitz, 2011). This taxonomy was based on interviews with individuals who experienced relapse following treatment and consisted of three hierarchically arranged levels of 1) the intra- and inter-personal precipitants to relapse, 2) eight additional categories within level 1 of the antecedents within the precipitants (e.g., coping with negative emotions, testing personal control, giving in to temptations, social pressure), and 3) additional subcategories of five of the eight categories in level 2 (Witkiewitz, 2011). Both the relapse taxonomy and the relapse model have been influential in the field of substance abuse and relapse and the taxonomy was tested for reliability and validity in classifying relapse episodes (Witkiewitz, 2011). Rigorous testing enumerated significant problems in reliability, construct validity, and predictive validity (Longabaugh, Rubin, Stout, Zyawiak, & Lowman, 1996; Maisto, Connors, & Zywiak, 1996; Stout, Longabaugh, & Rubin, 1996).

Following the recommendation for a revised conceptualization, Witkiewitz and Marlatt (2004) proposed the new cognitive-behavioral model of relapse as a nonlinear and dynamic system (Witkiewitz, 2011). This model drew from past research of relapse risk factors (e.g., Connors et al., 1996, Shiffman et al., 1997) and adopted the terminology of distal and proximal risk factors proposed by Shiffman in 1989 (Donovan, 1996). This revised model highlights the importance of the temporal relationship between these distal and proximal affective, behavioral, and cognitive factors during high-risk situations (Witkiewitz & Marlatt, 2004; 2007). Witkiewitz and Marlatt (2004) define high-risk situations as “circumstances in which an individual’s attempt

to refrain from a particular behavior (ranging from any use of a substance to heavy or harmful use) is threatened" (Witkiewitz & Marlatt, 2004, p. 224-5). Within this model, distal risk factors are enduring characteristics of the individual (i.e., coping skills) or of the environment (i.e. high-stress) that increase the risk of relapse. Proximal variables are those that occur immediately before relapse and complete the distal predisposition (i.e., cravings, negative affect). In addition, these risk factors may operate either as tonic (i.e. stable factors) or phasic (transient precipitants; Grace, 2000). For instance, Shiffman et al. (1997) noted that momentary beliefs in self-efficacy (i.e. phasic) predicted smoking relapse above and beyond a person's baseline level of self-efficacy (i.e., tonic).

Although research into the distal factors associated with relapse are inconclusive, likely due to their indirect effect on relapse and reliance on the presence of a proximal risk factor, McKay et al. (2006) have found that psychopathology, chronic stress, and poor social support affect rates of relapse. In an early study of the effects of distal risk factors such as background, cognitive variables, coping resources, life events, and pre-treatment characteristics on relapse concluded that all variables with the exception of life events were significantly associated with relapse, although proximal variables proved to be stronger predictors than did distal factors (Miller, Westergerg, Harris & Tonigan, 1996). In a similar study, Connors and colleagues (1996) found that background characteristics, treatment, coping skills, and alcohol use were significant predictors of relapse but that the indirect effects of the distal variables were relatively small. These findings are supportive of Witkiewitz and Marlatt's theory in that distal factors may not directly influence relapse, but rather influence relapse through their interaction with proximal variables.

Much more research has focused on the proximal variables associate with relapse and studies assessing affective factors generally have found that positive mood predicts lower relapse whereas negative mood predicts greater relapse (e.g., Mckay & Weiss, 2001; Tate, Brown, Unrod, & Ramo, 2004). In relation to cognitive factors, studies have shown that attributions following relapse, motivation for abstinence, self-efficacy, and cravings predict relapse (e.g., McKay & Weiss, 2001; Moore et al., 2013). Interpersonal factors have also been examined as proximal variables and personal problems and perceived criticism from partners tend to precede relapse (O'Farrell, Hooley, Fals-Stewart, & Cutter, 1998). According to theory, it is the interaction of these distal and proximal risk factors that may be present in high-risk situations that lead to relapse. For instance, a depressed person (distal factor) may experience a conflict with their significant other and as a result experience negative affect and cravings (proximal factor), which, taken together, increase the risk for relapse. As such, devising methods to extend traditional treatments to be more temporally linked to these post-treatment, high-risk situations may reduce relapse.

Treatment Reminder Cues

A promising option to reduce relapse is to use treatment reminder cues, or cues that are salient features of the treatment environment that facilitate the retrieval of memories regarding the effects of treatment when presented outside of the treatment context (Havermans & Jansen, 2003). This phenomenon has attracted a great deal of attention due to its important clinical implication; mainly that therapeutic benefits of treatment may be limited to the environment in which they were gained (Rodriguez, Craske, Mineka, & Hladek, 1999; Thomas, Drobes, & Deas, 2005; Denniston, Chang, & Miller, 2003). Bouton and Ricker (1993) found that treatment context plays an important role in relapse, in that a setting more closely related to the original

treatment setting is less likely to trigger cravings and relapse than a setting drastically different from that of the treatment environment. Therefore, when a salient feature of the treatment context is presented in a context other than that of treatment, the chance for relapse may be greatly reduced. Treatment reminder cues are ideal for extending the treatment context beyond the original treatment setting by reminding patients of salient concepts learned in treatment.

Evidence of the effectiveness of extending treatment to non-treatment contexts can be found in literature examining the effects of homework and booster sessions. Researchers have theorized that homework serves to generalize the therapy into other contexts of day-to-day living (Garland & Scott, 2002; Kazantzis, Deane, & Ronan, 2000). Furthermore, Mausbach and colleagues (2010) suggest that therapies found to be effective for anxiety disorders (Hofmann & Smits, 2008), depression (Spek et al., 2007), and substance use disorders (Duttra et al., 2008) may attribute their success to the use of homework as a mechanism to increase treatment outcome (Mausbach et al., 2010). The authors suggest that homework allows clients to practice strategies deemed helpful in alleviating symptoms, master skills in a natural setting, and promote outcome by extending the treatment beyond therapy (Kazantzis & Lampropoulos, 2002). In the first review of its kind assessing the effects of assigning homework, Kazantzis et al. (2000) found that homework was significantly and positively related to therapy outcome and that therapy outcome was predicted by homework compliance and completion. Mausbach et al. (2010) corroborated these findings in an updated meta-analysis. Results of their review indicated that increased homework compliance was associated with better treatment outcomes across a number of target symptoms, including substance use. With regard to specific substances, in a study investigating the effects of homework in treatment for cocaine dependence, Carroll, Nich, and Ball (2005) found that participants who completed more homework assignments used

significantly less cocaine during treatment and through a 1-year follow-up. Similarly, Gonzalez, Schmitz, and DeLaune (2006) found that homework compliance predicted reduced cocaine use following treatment, a relationship that was moderated by readiness to change. Taken together, these results suggest that expanding the treatment context is vital in allowing patients to generalize from treatment to their daily lives.

Similar evidence has been shown in research on the effects of booster sessions. Booster sessions have long been advocated as a maintenance strategy under the belief that continued indirect contact with the treatment context will help maintain treatment gains (Eysenck, 1963). Studies examining the effects of booster sessions on a number of psychological conditions revealed that, in general, booster sessions were found to be valuable in maintaining treatment outcomes and in increasing positive change. For instance, in a study examining the effects of booster sessions for depressed adolescents, the authors conclude that the sessions were helpful in improving upon the gains made during treatment and helped to accelerate recovery for those who did not respond to the initial treatment (Clarke, Rhode, Iewinsohn, Hops, & Deeley, 1999). Similarly, Baggs and Spence (1990) found that booster sessions following assertiveness training were also effective in enhancing the improvements made during the initial treatment.

Booster sessions have also been found to be effective following treatment for substance abuse and dependence. An early study on the effects of booster sessions for alcoholics found that the median number of days to relapse was significantly higher for those receiving booster sessions than for those not receiving booster sessions (Vogler, Lunde, Johnson, & Martin, 1970). A more recent study revealed that women randomized to receive booster sessions and life skills training as treatment enhancers showed significant reductions in alcohol use 18 months after treatment than did women who received only life skills training. The results provide support that

booster sessions can be employed as treatment enhancement strategies to reduce problematic alcohol use (Connors & Walitzer, 2001). Similarly, McCrady, Epstein, and Kahler (2004) found that among participants in a relapse prevention (i.e. booster sessions) program following alcohol behavior couples therapy fared better than those participating in Alcoholics Anonymous following treatment. More specifically, the more booster sessions a participant attended, the better their treatment outcome (McCrady et al., 2004). The authors also highlighted the importance of engaging clients in after-care strategies to help maintain the treatment effects and prevent relapse (McCrady et al., 2004).

Booster sessions provided via telephone have recently gained in popularity and do show to be effective. For instance, an investigation of the use of telephone booster sessions during smoking cessation treatment showed that participants engaged in both treatment and booster sessions were twice as likely to quit smoking as participants only engaged in treatment but not booster sessions (Metz et al., 2005). In a review of 5 studies and over 9,000 participants regarding the effectiveness of text messages as booster sessions during smoking cessation, Whittaker et al. (2011) found that text messages increased the chance of quitting from 4% to 5% in the control group, and from 6% to 10% in groups receiving text messages. These texts provided motivation and encouragement and offered practical advice on how to manage cravings and high-risk situations (Whittaker et al., 2011). Taken together, the literature suggests that providing continued reinforcement in the form of extending treatment is effective, lending further support to the possible effectiveness of using treatment reminder cues as a primary reinforcement mechanism. However, much research is left to be done specifically regarding the effects of booster or reminder strategies following substance abuse treatment. Although the use of booster sessions and homework has been shown to be effective, these methodologies are

discontinued or occur infrequently once standard treatment ends, thus increasing risk for relapse. Treatment reminder cues provide a cost effective modality for extending treatment to other contexts and beyond the time when standard treatment discontinues. Fortunately, with the advent of handheld computers we can now assess treatment reminder cues and their effectiveness as a relapse prevention tool in a more precise and comprehensive manner.

Ecological Momentary Assessments (EMA)

Given the significant drawbacks of retrospective reporting, assessment strategies that rely on momentary 'real-time' data collection are becoming more and more popular (Shiffman, Stone, & Hufford, 2008). As described by Shiffman et al. (2008), ecological momentary assessments address these pitfalls by examining behavior in real time and in the individual's natural environment. Most often, EMA studies involve collecting data throughout the day as the participant is going about their normal routine (Shiffman, 2009). EMA studies are especially indicated when a particular behavior, such as alcohol use, is of interest. As such, EMA studies have investigated a wide variety of symptoms, including eating disorders (Goldschmidt et al., 2014), trait anxiety and trait anger (Edmondson et al., 2013), trauma (Kleim, Graham, Bryant, & Ehlers, 2013), and mood disorders (aan het Rot, Hogenelst, & Schoevers, 2012). EMA studies have also proven particularly fruitful in studies of drug and alcohol use (Shiffman, 2009). Given the episodic and discrete nature of substance use, it lends itself particularly well to the event-oriented assessment provided by EMAs (Shiffman, 2009). In addition, given the research regarding the importance of proximal variables to substance use and relapse, momentary assessment of the immediate precursors to use is critical in understanding an individual's internal and external motivations. A concern regarding the use of an EMA protocol is its relatively substantial demand with regard to participant compliance. A legitimate argument is that

substance users may not be motivated or willing to comply with these requirements given their propensity for comorbid psychiatric conditions, their often chaotic lifestyles, and their general non-adherence to treatments (Shiffman, 2009). However, research consistently demonstrates that EMAs are indeed an effective tool to use with a substance using population. For instance, Freedman, Lester, McNamara, Milby, and Schumacher (2006) examined the utility of EMAs delivered via cell phone among a population of homeless crack-cocaine addicts. Their results showed an impressive compliance rate of 77% despite the demanding protocol of responding to phone calls every 3 hours day and night for 14 days. This study also evidenced a low dropout rate of 10% with an average dropout time of 1 day early, and a low rate of lost cell phones (only 1 in 30 was lost; Freedman et al., 2006). Epstein et al. (2009) also obtained good compliance rates over a 6 month period with crack and heroin users undergoing treatment. Similarly, Johnson, Barrault, Nadeau, and Swendsen et al. (2009) found EMAs to be effective for use with opiate abusing women, and Hopper et al. (2006) found EMAs to be effective with ecstasy users who were also concomitantly using alcohol, cannabis, cocaine, and hallucinogens. Taken together, these studies alleviate any doubt that EMAs are inappropriate for use with a substance abusing population and lend strong support for their utility.

EMAs and the Assessment of Relapse

The use of EMAs administered via handheld computers and diary technology have been studied for their ability to assess risk factors for daily use and relapse among individuals seeking treatment for smoking, and studies have shown that participants respond to at least 90% of random prompts (5 daily) for up to one month (e.g., Gwaltney, Shiffman, Balabanis, & Paty, 2005; Stone & Shiffman, 2002). Gwaltney et al. (2005) also found that lower self-efficacy within certain situations predicted relapse if such situations were present. Moreover, Shiffman et al.

(2007) found that whereas daily changes in negative affect did not predict smoking lapses, increases in negative affect were reported within a few hours of smoking lapses using electronic diaries. Taken together, these studies demonstrate high compliance rates to EMA protocols and provide strong support for their applicability in obtaining insights into relapse not obtainable through traditional assessment methods.

The use of handheld computer technology has also proven informative in studies of alcohol. For instance, an early study conducted by Litt, Cooney, and Morse (1998) used programmable watches to prompt participants to complete assessments and although the results are primarily methodological, the watches were deemed to be successful in prompting assessment responses. More recently, Krahn, Bohn, Henk, Grossman, and Gosnell (2005) recruited 68 alcohol-dependent men who used handheld computers to answer random prompts four times daily for 14 days about urges to drink and positive and negative affect. Results of cluster analyses showed that the largest cluster of participants reported low mean urge levels and low variability of urges during early abstinence. Similarly, Cooney et al. (2007) recruited 102 alcohol-dependent patients from outpatient substance abuse programs. Participants used handheld computers for 14 days to respond to four random prompts assessing mood states and cravings. Patients responded to 73% of the random prompts. Results showed that mood did not predict relapse, but a trend was found for cravings to predict relapse. In a sample of participants entering treatment for concurrent cocaine and heroin use, Epstein and colleagues (2009) found that cravings and negative affect were related to cocaine relapse and feeling worried was associated with heroin relapse. In a study of patients with concurrent alcohol and tobacco use, Holt, Litt, and Cooney (2012) assessed antecedents to first drink using handheld computers over

a 28 day period. The authors reported a compliance rate of 65% and found that drinking relapse was preceded by lower confidence to resists cravings.

Most significantly, the EMA investigation of the effects of cravings and affect on risk for relapse following substance use treatment conducted by Moore et al. (2013) informed both the design and the methodology of this project. The author held an integral role in this prospective, longitudinal grant-funded study investigating the use of handheld computer technology to assess the proximal variables surrounding relapse. The Moore et al. study examined proximal variables related to relapse among a sample of 100 men and women entering outpatient treatment at Cornerstone of Recovery, the same facility in which this current study was conducted. Handheld computers prompted participants four times daily for four months regarding a variety of proximal variables. Participants also completed assessment measures at baseline and 2- and 4-month follow-ups. Descriptive analyses indicated a compliance rate of 47% with the diaries (over 10,000 received), 92% with the 2-month follow-up packet, and 79% with the 4-month follow-up packet. Overall, relapse occurred in 42% of the experimental participants and 48% of the control participants (not significantly different). Hierarchical linear modeling (HLM) revealed that cravings and negative affect such as anger and stress were significantly temporally associated with relapse. These studies suggest that patients in substance abuse treatment will respond sufficiently to handheld computer prompting and that using such technology could be valuable for assessing the process of relapse.

Rationale for the Proposed Study and Significance

Given the high prevalence of substance dependence and relapse, it is vital to develop effective means to extend standard treatment in a cost effective and minimally time consuming manner to reduce relapse. Using diary technology has been shown to be feasible and to evidence

excellent compliance rates (up to 98%) in studies examining factors associated with daily substance use (e.g., Carney, Armeli, Tennen, Affleck, & O'Neil, 2000; Hussong, 2007), suggesting that this methodology holds promise in the present study. This methodology is also effective in greatly increasing the frequency and quantity of obtainable data while reducing the burden placed upon the participants. More specifically, treatment reminder cues provide a cost effective modality for extending treatment to other contexts and beyond the time when standard treatment discontinues. This project is particularly innovative in that it is the first known study using handheld computers to administer these treatment reminder cues as a form of relapse prevention to patients entering treatment based on an Alcoholics Anonymous (AA) approach. As part of the standard AA treatment program, patients are repeatedly exposed to phrases associated with treatment (e.g., 90 meetings in 90 days, call your sponsor). Over time, these phrases become synonymous with treatment and become cues or salient features of the treatment that may reduce relapse when presented following termination of standard treatment. Treatment reminder cues presented on handheld devices provide an ideal mechanism by which to extend the treatment context beyond the original treatment setting. By extending the effect of treatment into an individual's natural environment, it follows that treatment reminders may be effective in attenuating the rates of relapse, or at the least, delay the onset of relapse to substance use. As such, the overarching goal of the this study is to determine the extent to which electronic treatment reminder cues administered via handheld computers are effective in extending treatment gains into post-treatment environments and in reducing relapse. A secondary goal of this study is to explore the extent to which distal factors (e.g., psychopathology, self-efficacy) and proximal factors (e.g., cravings, negative affect) influence the impact of treatment reminder

cues on rates of relapse, as well as the association between treatment reminder cue compliance and relapse. The specific hypotheses are:

Hypothesis 1. Adding treatment reminder cues to standard outpatient treatment will result in less relapse relative to standard outpatient treatment alone.

Hypothesis 2. When relapse happens, its onset will occur significantly later for those who received standard outpatient treatment plus reminder cues relative to those who received standard outpatient treatment alone.

Hypothesis 3. Greater compliance with responding to treatment reminder cues will be associated with lower relapse.

The examination of the effectiveness of treatment reminder cues represents a new and innovative approach to attenuating relapse following substance abuse treatment and will provide information to increase the efficacy of relapse prevention programming. The finding that treatment reminder cues serve to reduce the risk for relapse following treatment could be used by prevention programs to greatly enhance the effects of formal treatment upon traditional treatment termination. Additionally, the finding that handheld computers are effective in distributing treatment reminders and reducing relapse, could lead to their use as a tool to administer more complex and formal treatments and further reduce treatment related costs and significantly reduce relapse rates. Furthermore, this study has the potential to inform future research using other technological avenues to disseminating psychological interventions (e.g., mobile telephones). Given the recent electronic health movement, providing an inexpensive avenue for mental health treatment that allows a greater majority of individuals to obtain treatment is becoming increasingly important. This project has the potential to provide vital information on the feasibility and effectiveness of interventions provided electronically. Lastly, this study is the

first investigating handheld technology in the context of substance abuse treatment and could lead to numerous future studies designed to improve substance abuse treatments.

Chapter 2

Methods

Overall Strategy

This study utilized a one-month randomized-controlled design to investigate the extent to which treatment reminder cues reduced relapse at a greater rate than standard care among 50 men and women completing substance abuse treatment at Cornerstone of Recovery. This design used state-of-the-art electronic handheld computers involving random exposure to treatment reminder cues four times daily for one month. Electronic surveys were also administered once daily to assess cravings, negative affect, and substance use (Appendix A). For the initial contact, all participants completed questionnaires of variables that may affect relapse and received training in using a handheld computer. Participants were then randomly assigned to the experimental (standard treatment plus treatment reminder cues) or control condition (standard treatment only). Subsequently, participants completed a 1-month follow-up assessment.

Design considerations. In preparing for this study, several design features were carefully considered, the first of which was the most appropriate frequency for participants to receive treatment reminders cues. The goal was to select a frequency that minimized burden to participants while maximizing effects of exposure to treatment cues on preventing relapse. Studies using 5-8 random daily prompts showed compliance rates of approximately 86% (Hufford, Shields, Shiffman, Paty, & Balabanis, 2002; Litt et al., 1998). In an ecological momentary assessment study conducted by Moore et al. (2013), results showed a 47% compliance rate when prompts were presented four times per day for four months and took 5 minutes to complete. As such, in the present study, random treatment reminder cues were

presented four times per day, along with a daily diary assessment. The time required for participants to respond to the treatment reminder cue was one minute or less per prompt.

A second design consideration was the type of control group to be utilized in this study. In our previous study (i.e., Moore et al., 2013), the control group did not receive a handheld computer but completed the baseline and follow-up assessments. The commensurate relapse rates between the experimental (42%) and control (48%) conditions indicated that simply having the handheld computer did not affect rates of relapse, suggesting that being assigned a handheld in and of itself did not increase or decrease risk for relapse. Therefore, for this study, a control group that did not receive the handheld computer and only completed the baseline and follow-up assessments was utilized.

A third consideration was the best method for defining relapse. There is considerable discord in the literature with some studies using "any" substance use, and some using "heavy" consumption to define relapse. In this study, "relapse" was operationalized as an initial return to any substance use (consistent with an AA treatment model used at the study location). Given that relapse rates above 40% were found in the preliminary study, there will be sufficient power to assess the effectiveness of adding treatment reminder cues using this approach to operationalize relapse.

Preliminary Studies

Focus group to identify effective treatment reminder cue messages. In preparation for this study, the author conducted a focus group at Cornerstone of Recovery. The focus group was designed to gather information regarding the content of the treatment reminders. The focus group generated a list of 140 phrases identified as salient by patients and staff. A formal survey with these phrases was then created and administered to 59 patients at the treatment facility. The

participants were asked to rate each of the phrases on a scale of 1 (not important for recovery) to 5 (very important for recovery). Following the focus group, the phrases were narrowed down to 94 phrases that participants found most useful in their recovery (i.e., average rating of 3 or greater; Appendix B). Each prompt used a different randomly-selected cue and all participants received the same cues at the same time.

Participants

Participants were 50 patients entering the Intensive Outpatient Program (IOP) for substance abuse treatment at Cornerstone. Cornerstone accepts approximately 160 new adult patients into the IOP program each year and provides activity therapy, group therapy, education groups, stress management, and family therapy following a 12-step recovery model. Treatment lasts approximately 4 to 8 weeks. Patients were eligible to participate if they were at least 18 years old, able to speak English (to ensure comprehension of research materials), receiving treatment for alcohol or an illicit drug, and did not meet criteria for a psychotic disorder. Patients of all ethnic groups were eligible to participate. Participants were recruited upon entering treatment via a member of the investigative team. This member was on-site twice weekly to meet with patients who were informed of the study by treatment staff; a method that was found to be effective in the preliminary study. Interested patients participated in a brief screening interview and received a detailed overview of the project. Eligible participants were then randomly assigned to the treatment or control conditions and were scheduled for the baseline assessment and electronic diary training at Cornerstone.

Based on prior studies, we expected to be able to complete follow-up interviews with 80% of the participants enrolled in the study over a 1-month period. Every effort was made to increase compliance and decrease attrition over the course of the study. To reduce attrition,

participants received financial compensation. Participants earned $5 for completing the baseline assessment, $0.50 for each treatment reminder cue that they completed within one hour of prompting, $1.00 per completed daily diary, and $5 for completing the follow-up assessment. Other steps to reduce attrition included gathering contact information for relatives or friends who served as locators if there was particular difficulty contacting a participant, as well as promptly compensating participants.

Procedures

Patients interested in participating received a detailed overview of the project and payment schedule and were asked for their consent to participate in a brief screening interview. If the inclusion criteria described above were met, participants completed informed consent procedures (Appendix C). Once informed consent was secured, participants were asked to complete a packet of surveys (see measures below). Participants were then randomly assigned to the experimental and control conditions and those in the experimental condition received training on how to operate their handheld computer and how to read and respond to the treatment reminder cues and daily surveys. Participants used HP iPAQ 110 handheld computers to respond to reminder cues and daily diary prompts. The handheld computers possessed a free wireless account for transferring data to a computer in the lab following each entry. Consistent with the preliminary study, a schedule was developed with each participant for weekly meetings at Cornerstone with the researcher while in treatment. This meeting was designed to provide payment for participation and address problems that arose during the course of the study. Upon completion of treatment (e.g., 4 weeks), participants returned the handheld device and completed the 1-month follow-up assessment.

Measures

Assessments focused on four domains: a) screening measure, b) measures of demographic and distal variables, c) treatment reminder cues, and d) electronic diaries.

Screening Measure. During the screening interview, participants provided information to determine eligibility (i.e., age, language). Participants also responded to questions regarding past and current psychosis. Participants who met criteria for past or current psychosis were ruled out of the study and referred back to their treatment provider (Appendix D).

Demographic and Distal Measures. At baseline, participants completed a demographics questionnaire (e.g., education level, religion, ethnicity) and a number of relevant distal measures related to risk for relapse (Appendix E). The *Structured Clinical Interview for DSM-IV* (SCID-P; First, Spitzer, Gibbon, & Williams, 1995) was administered to assess diagnostic criteria for substance use and other Axis I psychopathology (Appendix F). Adequate reliability of the SCID has been demonstrated (First et al., 1995). This measure was administered by a trained graduate student research assistant (RA). The first five interviews were observed by the researcher to ensure compliance with assessment directions.

Substance use. The *Alcohol Use Disorders Identification Test* (AUDIT; World Health Organization, 1982) is a simple tool used to identify people at risk for alcohol problems. This measure was utilized in this study as a method to assess relapse. It boasts a 92% sensitivity and 94% specificity (Appendix G). Similarly, the *Drug Use Disorders Identification Test* (DUDIT; Berman, Bergman, Palmstierna, & Schlyter, 2005) is used to identify individuals at risk for drug use. It predicts dependence with a sensitivity of 90% and specificity at 88%. Its reliability coefficient is 0.80 (Berman et al., 2005l; Appendix H).

Social support. Perceived social support was assessed with the *Social Support Questionnaire* (SSQ; Sarason, Levine, Basham, & Sarason 1983), which measures availability of and satisfaction with social supports. This tool also has excellent reliability and validity estimates (Appendix I).

Affect. The *Positive and Negative Affect Scale* (PANAS; Watson, Clark, & Tellegen, 1988) was used to assess various positive and negative moods on a number of time scales. Its alpha reliabilities are high, ranging from 0.86 to 0.90 for positive affect and 0.84 to 0.87 for negative affect (Watson et al., 1988; Appendix J).

Treatment Reminder Cues. The treatment reminder cues were administered four times daily via the HP iPAQ 110 handheld computer using the SnapSurvey® software package. The content of the reminder cues was randomly generated from the database containing the phrases identified via the focus group and subsequent surveys gathered at Cornerstone as being particularly salient in participants' recoveries (see Preliminary Studies). Ninety-four possible phrases were stored in the database. With 112 treatment reminder prompts over one month, participants were exposed to each prompt between 1 and 2 times. Participants were asked to respond to the treatment reminder cues by completing a multiple choice question indicating which treatment reminder cue they were exposed to. This ensured that participants were attending to the reminder cues. Responding to the question associated with each cue took less than one minute. The handheld computers' alarm clocks were programmed to generate an automatic prompt for the participant to read and respond to the cues. This software was ideal for this study, as it allowed information to be sent via wireless encrypted communication to a stand-alone secure computer and avoided frequent lab visits to download data. Participants were thoroughly trained in responding to reminder cues and no prior experience using a computer was

necessary. Assistance was provided on an as-needed basis and a member of the research team was on-site twice weekly to address any problems. Compliance was tracked with SnapSurvey® software.

Electronic Diary Questionnaire. Participants were prompted once daily to complete the Electronic Diary Questionnaire. Many of the questions were adapted from well-validated measures, such as the *Positive and Negative Affect Scales* (Watson et al., 1988) to assess affect. This prompt occurred at a pre-determined time indicated by each participant. SnapSurvey directed participants to answer questions about past 24-hour affect, cravings, triggers for craving, and substance use. If substance use occurred, participants were prompted to indicate the type of substance used, trigger(s) for use, and time use began and ended. Participants were able to indicate if more than one period of craving and/or substance use occurred and to answer relevant questions for each episode. All participants were trained during baseline in quantifying drinks and categorizing classes of drugs. This combination of prompts and questions maximized the likelihood of assessing events preceding relapse. Additionally, using the electronic diary questionnaire allowed for a more accurate assessment of whether relapse occurred and the extent to which exposure and responses to treatment reminder cues were temporally linked to relapse. Because clients were not be asked to report use when responding to the treatment reminder cues, utilizing the daily questionnaire was vital in assessing factors temporally associated with relapse.

Identifying Relapse. All participants in the study were informed of confidentiality procedures regarding reporting relapse. An agreement with Cornerstone provided that participant relapse did not need to be reported to treatment staff in an effort to ensure maximum disclosure. Unless reported verbally by a participant during the study, sources of reported relapse were not analyzed until after the study's completion at which time several strategies were used to identify

relapse. First, participants in the experimental condition were asked to report relapse via the daily diary on their handheld computers; second, all participants were asked to report relapse on the AUDIT and DUDIT included in their follow-up packets; and third, a thorough review of Cornerstone's online medical health records was conducted to determine whether participants relapsed during the study but failed to report it via study material, or after leaving the treatment facility following treatment termination.

Data Management and Storage. Data management and data entry were conducted by trained RAs under the guidance of the author. Each response to a treatment reminder cue and electronic diary entry was automatically sent via wireless communication from the handheld computer to a password-protected computer for data storage. Project data collected at baseline and one-month follow-ups were double coded by multiple research assistants to ensure reliability.

Chapter 3

Results

Descriptive Statistics: Overall Sample

Overall, 50 participants were included in data analysis; 25 in the experimental condition, and 25 in the control condition. For the entire sample, the average age was 37.20 (SD = 12.2) (range = 18-63). More men (n=32) than women (n=18) participated in the study. The majority of the sample identified as Caucasian (86%), with an additional 6% identifying as Black/African-American, 4% Hispanic, and 4% Native American. Further, the majority of the overall sample attended college or a professional school (40%), had an average annual income of $50,001 to $100,000, were single (42%), identified as heterosexual (88%), identified as Non-Catholic Christians (46%), and those in relationships were so for an average length of 72 months (see Table 1 for detailed sample characteristics). Among the sample, 70% received an Alcohol Dependence diagnosis and 60% received a Drug Dependence diagnosis (cannabis 10%, cocaine 10%, other stimulants 7%, opioids 27%, sedatives 3%, and poly drug dependence without alcohol 43%).

Descriptive Statistics: Experimental Condition

Within the experimental group, the mean age was 33.6 (SD = 11.61). As in the overall sample, 64% of the participants were male and 88% identified as Caucasian. The majority in this group had only a high school education (40%), earned less than $25,000 per year, and were unemployed. Most (48%) were single and identified as heterosexual (76%). Those in relationships were partnered for an average of 52 months. Most (36%) identified as Non-Catholic Christians. Within this group, 56% received an Alcohol Dependence diagnosis and 64% received

Table 1

Participant Characteristics

Characteristic	M (SD) or %
Full Sample *(N = 50)*	
Age (M, SD)	37.2 (12.2)
Sex (%)	
Males	64.00
Females	36.00
Race (%)	
Caucasian	86.00
African American	6.00
Hispanic	4.00
Native American	4.00
Education (%)	
Grade school	4.00
High school diploma	32.00
Attended College	40.00
College degree	14.00
Graduate degree	10.00
Employment (%)	
Unemployed/Disability	48.00
Employed part-time	4.00
Employed full-time	48.00
Annual Income (%)	
Less than $25,000	28.00
$25,001 -$50,000	20.00
$50,001-$100,000	34.00
$100,001-$150,000	16.00
Greater than $150,001	2.00
Religion	
Catholic	22.00
Non-Catholic Christian	46.00
Jewish	2.00
Other	30.00
Marital Status	
Single	42.00
Dating	6.00
Married	30.00

Table 1. Continued.

Characteristic	M (SD) or %
Separated	12.00
Divorced	10.00
Relationship length	71.96 (111.83)
Experimental Condition *(N = 25)*	
Age (M, SD)	33.6 (11.61)
Sex (%)	
Males	64.00
Females	36.00
Race (%)	
Caucasian	88.00
African American	4.00
Hispanic	8.00
Education (%)	
Grade school	4.00
High school diploma	40.00
Attended College	36.00
College degree	12.00
Graduate degree	8.00
Employment (%)	
Unemployed/Disability	56.00
Employed part-time	8.00
Employed full-time	36.00
Annual Income (%)	
Less than $25,000	36.00
$25,001 -$50,000	20.00
$50,001-$100,000	28.00
$100,001-$150,000	16.00
Religion	
Catholic	22.00
Non-Catholic Christian	46.00
Jewish	2.00
Other	30.00
Marital Status	
Single	48.00
Dating	8.00
Married	24.00

Table 1. Continued.

Characteristic	M (SD) or %
Separated	8.00
Divorced	12.00
Relationship length	51.64 (87.74)
Control Condition *(N = 25)*	
Age (M, SD)	40.80 (11.94)
Sex (%)	
Males	64.00
Females	36.00
Race (%)	
Caucasian	84.00
African American	8.00
Native American	8.00
Education (%)	
Grade school	4.00
High school diploma	24.00
Attended College	44.00
College degree	16.00
Graduate degree	12.00
Employment (%)	
Unemployed/Disability	40.00
Employed full-time	60.00
Annual Income (%)	
Less than $25,000	20.00
$25,001 -$50,000	20.00
$50,001-$100,000	40.00
$100,001-$150,000	16.00
Greater than $150,001	4.00
Religion	
Catholic	8.00
Non-Catholic Christian	60.00
Jewish	4.00
Other	28.00
Marital Status	
Single	36.00
Dating	4.00
Married	36.00

Table 1. Continued.

Characteristic	M (SD) or %
Separated	16.00
Divorced	8.00
Relationship length	92.28 (130.23)

a Drug Dependence diagnosis **(**cannabis 6%, cocaine 6%, other stimulants 13%, opioids 19%, and poly drug dependence without alcohol 56%).

Descriptive Statistics: Control Condition

The mean age in the control group was slightly higher with a mean of 40.8 years (SD = 11.94). As in the experimental condition, 64% were men and 84% identified as Caucasian. This group was also more educated, with the majority reporting attending college or professional school. They also earned $50,001 to $100,000 per year and reported full time employment. An equal percentage were single or married (36%), with an average relationship length of 92 months. All were heterosexual and reported being of Non-Catholic Christian faith. Among this group, 84% received an Alcohol Dependence diagnosis and 56% receiving a Drug Dependence diagnosis **(**cannabis 14%, cocaine 14%, opioids 36%, sedatives 7%, and poly drug dependence without alcohol 29%).

Significant Differences across Conditions

Chi-square tests were used to determine whether significant differences existed across the control and experimental conditions. No significant differences were found for gender, education, ethnicity, religion, income, employment, marital status, or sexual orientation. Independent sample t-tests were used to examine differences in age and relationship length across the two conditions. Results showed that individuals in the control group tended to be older

than those in the experimental group $t(48) = -2.162$, $p = 0.036$. Those in the control condition were also significantly more likely to have been diagnosed with an Alcohol Dependence Disorder χ^2 (1) = 4.667, $p = 0.031$ but no group differences were found for frequency of drug-related diagnoses, or differences in which drugs participants used (see Table 2).

Table 2

Demographic Differences across Conditions

Characteristic	χ^2
Gender	0.00
Education	1.54
Ethnicity	4.34
Religion	7.65
Income	2.67
Employment	4.17
Marital status	2.23
Sexual orientation	6.82
Alcohol dependence	4.67*
Drug dependence	0.33
Drug classifications	5.55
Characteristic	**t**
Age	-2.13*
Relationship length	-1.29

Note. * $p < .05$

EMA Methods and Relapse

Hypothesis 1. *Adding treatment reminder cues to standard outpatient treatment will result in less relapse relative to standard outpatient treatment alone.*

Relapse was defined as any return to substance use and was primarily identified via Cornerstone of Recovery's computerized medical records system. None of the participants

reported relapse on the daily diaries on the handheld computers, or on the AUDIT and DUDIT included in the follow-up packets. Within the overall sample, 11 out of 50 participants (22%) relapsed *during* the study. A trend appeared for more individuals in the control group to relapse compared to the experimental group, χ^2 (1) = 2.914, p = 0.08; three individuals in the experimental group (12%) and eight in the control group (32%). Although this is not a statistically significant difference, it potentially has important clinical implications that are discussed below. No significant differences in terms of demographic variables were found among those who relapsed *during* the study across the two conditions (see Table 3).

Table 3

Differences between Those Who Relapsed During the Study and Those Who Did Not Relapse

Characteristic	χ^2
Gender	4.66
Education	1.01
Ethnicity	2.30
Religion	6.92
Income	7.00
Employment	3.62
Characteristic	**t**
Age	-1.04
Relationship length	-1.88

Hypothesis 2. *When relapse happens, its onset will occur significantly later for those who received standard outpatient treatment plus reminder cues relative to those who received standard outpatient treatment alone.*

Time-to-relapse was defined as the amount of days after beginning the study in which a participant relapsed. An independent t-test analysis was used to examine any statistical differences across control and experimental group participants who relapsed *while* participating in the study. Results revealed that the average amount of days to relapse was not significantly different across the two groups, $t(9) = 1.743$, $p = 0.115$. The average length of time for participants in the experimental group to relapse was 38 days (SD = 17.34, Range = 19 - 53) and 20 days (SD = 14.46, Range = 2 - 37) for those in the control group.

Importantly, four individuals originally in the experimental group relapsed *after* the study concluded, whereas none of the control group participants relapsed following study completion. Results showed that those in the experimental group who relapsed either *during* or *after* the study relapsed later than those in the control group, representing a statistically significant difference, $t(13) = 2.685$, $p = 0.026$. Furthermore, individuals who relapsed after the study did not differ significantly on any demographic variables when compared to those who relapsed during the study, indicating that the treatment reminder cues likely accounted for this delayed return-to-use (see Table 4). Interestingly, those who relapsed regardless of whether during or after the study, were in relationships of significantly shorter length than those who did not relapse, $t(48) = -2.234$, $p = 0.002$ (see Table 5). Furthermore, those who relapsed did not differ significantly with regard to size and quality of their support networks when compared to those who did not relapse, $t(45) = 0.85$, $p = 0.40$ and $t(48) = -0.78$, $p = 0.44$, respectively.

Table 4

Differences between Those Who Relapsed After the Study and Those Who Did Not Relapse

Characteristic	χ^2
Gender	0.37
Education	1.77
Ethnicity	0.71
Religion	1.86
Income	1.70
Employment	1.81
Characteristic	**t**
Age	-1.10
Relationship length	-0.83

Table 5

Differences between All Who Relapsed and Those Who Did Not Relapse

Characteristic	χ^2
Gender	0.66
Education	2.59
Ethnicity	3.49
Religion	4.78
Income	6.81
Employment	3.37
Characteristic	**t**
Age	-1.62
Relationship length	-2.23*

Note. * $p < .05$

Compliance Rates

Hypothesis 3. *Greater compliance with responding to treatment reminder cues will be associated with lower relapse.*

A total of 2,296 of 2,800 treatment reminder cues were answered (Mean = 87.48, SD = 29.5, Range = 14-112 out of 112 possible). The overall compliance rate for the treatment reminder cues was 82%. In addition, of the 700 total daily diary entries, participants completed 511 daily surveys (Mean = 19.6, SD = 7.7, Range = 2-28 out of 28 possible), resulting in an overall daily diary compliance rate of 73%. The compliance rate for completing the 1 month follow-up assessment was 72%. A binary logistic regression was used to determine if relapse rates for those who relapsed during the study differed based on the number of treatment cues to which they responded. Results showed that increased compliance with treatment cues did not significantly predict relapse, χ^2 (1) = 0.273, p = 0.601. A second logistic regression was used to examine whether increased compliance was associated with relapse for those who relapsed after the study. Again, results showed that increased compliance was not associated with relapse following the study, χ^2 (1) = 0.881, p = 0.348. Similarly, results from a third logistic regression showed that compliance rate was not associated with relapse for all individuals who relapsed, regardless of whether they relapsed during or after the study, χ^2 (1) = 1.358, p = 0.244.

Effects of Cravings and Affect on Relapse

To examine the effects of cravings on risk for relapse, we conducted a series of independent sample t-tests. Results indicated that average ratings of cravings for drugs or alcohol did not differ significantly for those who relapsed during the study when compared to those who did not relapse, t(489) = -1.045, p = 0.296. Average cravings also did not differ for those who relapsed after the study when compared to those who did not relapse, t(489) = -0.639, p = 0.523,

or when comparing all participants who relapsed to those who did not, $t(489) = -1.256$, $p = 0.21$. Similarly, independent sample t-tests revealed that baseline levels of self reported positive and negative affect were not significantly related to relapse (Table 6).

Table 6

Comparing Positive and Negative Affect for Those Who Relapsed Versus Those Who Did Not

Variable	t
All Relapse *(N = 11)*	
Positive Affect	0.87
Negative Affect	0.58
Relapse During Study *(N = 7)*	
Positive Affect	1.52
Negative Affect	0.32
Relapse After Study *(N = 4)*	
Positive Affect	-0.82
Negative Affect	0.49

Chapter 4

Discussion

The findings of this study broaden the literature on relapse prevention by being the first to use handheld computers to test the extent to which they can be used as a tool to extend the salient components of substance abuse treatment to non-treatment settings. It is also the first to examine the use of treatment reminder cues as the means to present information learned during treatment to settings outside of the immediate therapeutic environment in which an individual may operate both during and after treatment. Given that a large percentage of individuals relapse during and following treatment, this study is especially important in that it potentially provides a cost efficient, simple, and effective strategy to 'remind' participants of the relapse-prevention techniques they have learned during treatment while they are not actively engaged in treatment or treatment-related activities.

Indeed, our results suggest that treatment reminder cues may be an effective way to prevent and reduce relapse during intensive outpatient treatment. Although only a trend emerged when comparing the rates of relapse of individuals in the control group versus those in the experimental group, this finding has significant clinical implications. Specifically, more than twice as many people in the control condition relapsed *during* the study than did people in the experimental condition (eight versus three). Results also found that these individuals did not differ significantly on any demographic variable. Taken together, and given that the only difference across these groups was the use of the handheld computers to deliver treatment reminder cues, suggests that these cues may be an effective way of attenuating relapse. It is likely that the small sample size affected our power to detect *statistically* significant differences in relapse, although the *clinical* significance is evident. Rosenthal's (1995) investigation of the

effectiveness of aspirin therapy highlights the distinction of clinical versus statistical significance and illustrates that statistical information may only account for part of the value of a particular finding. In his study, Rosenthal found that giving participants aspirin was so effective in preventing heart attacks that it would have been unethical to continue providing a placebo replacement to the control group. Interestingly, the effect size of the ability of aspirin to prevent heart attacks was well below 0.2 which by today's standards is considered a small effect. Despite the small statistical impact of the aspirin intervention, the clinical implications of saving even just one individual from a heart attack were too important to disregard. Although reducing relapse may not be as broadly applicable as reducing heart attacks, the clinical value of reducing relapse during substance abuse treatment by half is important to consider when examining the utility of treatment reminder cues.

Although treatment reminder cues may be effective in attenuating relapse *during* substance treatment, results from this study also showed that treatment reminder cues may be effective in delaying relapse *after* treatment. More specifically, data showed that four individuals in the experimental group relapsed after the study concluded whereas none in the control group relapsed after study termination, and time-to-relapse analyses showed that those in the experimental group relapsed significantly later than did those in the control group. Taken together, these findings suggest that treatment reminder cues may be an effective tool in delaying the onset of relapse, not only during treatment, but also after treatment completion. Given that the treatment reminder cues were not actually presented outside of the IOP setting, yet still had some carry-over effects after treatment, suggests that presenting cues while a participant is in outpatient treatment is sufficient in generalizing the treatment outside of the immediate therapeutic setting. In other words, presenting treatment reminder cues randomly throughout the

day ensures that they are administered while the participant is in a variety of non-treatment settings, allowing for the generalization of treatment reminder cues to a broad array of settings in which patients may operate following treatment. As such, day-to-day settings become associated with treatment in some salient way thereby reducing the likelihood of relapse.

Furthermore, we found that higher compliance, and by extension, more exposure to treatment reminder cues was not significantly associated with reduced relapse. In other words, those who responded to only a handful of reminder cues were no more likely to relapse than those who responded to all 112 cues throughout the study. This suggests that even minimal exposure to reminder cues can have effects on delaying relapse, and that there is likely some generalizability across settings in which participants actively responded to cues. As an illustrative example, for a participant who only responded to 20 cues while at work and while at the IOP living facility, but not while in school at the local college, the treatment reminder cues to which he responded may have provided enough of an extension of what he learned in treatment to non-treatment related settings, to where the effects generalized from the work and IOP living facility to also include the school environment in which he did not respond to reminder cues. As such, responding to more cues may not have provided any additional benefits. A weakness to these findings is the inability to identify in which environments participants received and responded to their cues. An informative and important follow-up study would be one in which participants are tracked with regard to where they are exposed to reminder cues to determine if exposure while in certain settings allows for broader generalizability than others. Another important topic for future research is whether there is a threshold for the amount of reminder cues to be effective and at which point exposure to additional cues stops having additive value with regard to relapse attenuation. Although more frequent exposure is not statistically related to

decreased relapse, this study found that once treatment reminder cues were terminated for those in the experimental condition, relapse rates increased to be nearly identical to those in the control group. This suggests that *longer,* but not necessarily *more,* exposure to reminder cues is necessary in order to maintain longer-term effects. Extended exposure allows for the reminder cues to be presented in a more varied array of settings, increasing their generalizability to other areas in which the patient may operate on a daily basis.

An interesting finding emerged when comparing those who did not relapse to those who did, regardless of whether they relapsed during or after the study. Specifically, those who did not relapse were in relationships of significantly longer length than those who did. Surprisingly, these participants did not differ with regard to relationship status and were equally likely to be single, married, or separated. They also did not differ with regard to baseline levels of perceived social support or satisfaction with their support network. These findings suggest that being in longer term relationships in and of itself may have protected against relapse regardless of the perceived size and quality of a participant's support network, and is in line with research on the protective nature of long-term, committed relationships. For instance, literature shows that marriage and committed long-term relationships provide a sense of well-being, emotional support, and mutual reinforcements between individuals (Gove, Style, & Hughes, 1990; Kim & McKenry, 2002), and that those in healthy long-term relationships tend to be happier and more productive (Ren, 1997). In light of this research and despite the fact that marital status did not protect our participants from substance addiction in the first place, it is possible that those in longer term relationships were protected from relapse by virtue of having a more secure and established family support system and perhaps more incentive to remain sober. Those in shorter term relationships may experience more relational instability, less support from their significant

other, and less extrinsic motivation to avoid relapse, making them more vulnerable to return to substance use.

Overall, this study possessed a number of significant strengths that make it a valuable asset in the relapse prevention literature. First, the use of handheld computers is cutting edge methodology that is gaining in popularity among researchers. The use of state-of-the-art technology afforded the opportunity to address limitations of retrospective studies (i.e., retrospective recall bias) and to administer the intervention in a minimally invasive and cost effective manner with reduced concern for the potential that reactivity to assessment would increase the relapse rate. Second, this study is the first to examining the effects of extending treatment contexts by using reminder cues. Our findings from this study are promising for the effectiveness of using this methodology to attenuate and delay relapse and set important groundwork for future research in this area. Third, by demonstrating that patients in treatment will provide frequent responses and can be highly compliant with the use of handheld devices, this study also suggests that handheld computers may be of great utility for treatment delivery, especially for patients who might otherwise not seek treatment or have limited capabilities to attend treatment.

Although this study possesses a number of strengths, one limitation is that relapse was only identified via the online medical records system and no participant reported relapse on their handheld device. A likely explanation is that reporting relapse while in treatment at Cornerstone has serious implications, including being removed from the IOP program. Although participants were informed about confidentiality procedures, it is possible that some feared the negative consequences associated with reporting and therefore avoided this type of disclosure while the study was ongoing. However, Cornerstone maintains detailed online medical records, including

results from drug screenings and peer reports of misconduct. In addition, staff conduct monthly follow-up consults with each patient following treatment, during which they are asked to report on sobriety and relapse. For this study, relapse data during and after the study duration were gathered primarily from these online medical health records. To reduce this shortcoming, future studies should use calendar-based interviewing to help participants remember certain events through the use of specific time markers, as well as frequent biochemical verification, and collateral reports.

Another limitation is the timeframe in which this study was conducted. Because participants were only exposed to treatment reminder cues while in the IOP program, this study did not capture the effects of treatment reminder cues when presented entirely outside of a therapeutic setting. Although participants in IOP generally have jobs and social commitments, their daily lives rarely resemble the typical experiences of a participant at home going through their typical daily routines. As such, the generalizability of the effects of treatment reminder cues may not extend beyond the time at which a participant leaves the IOP setting and returns to the environments in which they previous engaged in substance use. An important follow-up study would be one that examines the effects of reminder cues both while a participant is in treatment *and* after a participant has returned home. Such a study would be better able to identify whether the cues are salient enough to remind the participants of what they have learned in treatment while they are no longer engaged in the formal treatment process.

Another limitation is the small sample size that did not provide sufficient power to detect what may be significant effects of reminder cues on relapse. Power analyses using the G*Power GUI (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that a total sample of 88 participants (44 in each condition) would be necessary to detect statistically significant differences in relapse.

Given that there is no agreed upon strategy for calculating effect sizes and conducting power-analyses using multi-level models (e.g., see Roberts & Monaco, 2006), we assumed standard regression models. This assumption is likely to provide a more conservative estimate of the necessary sample size due to the power gained by numerous surveys from each person. Thus, we calculated the necessary sample size needed to attain a medium effect (d=.30) with power of 0.8 and two-tailed significance tests of .05 (see Figure 1). Future research with larger samples and more power could confirm that utilizing reminder cues does indeed significantly reduce the rates of relapse.

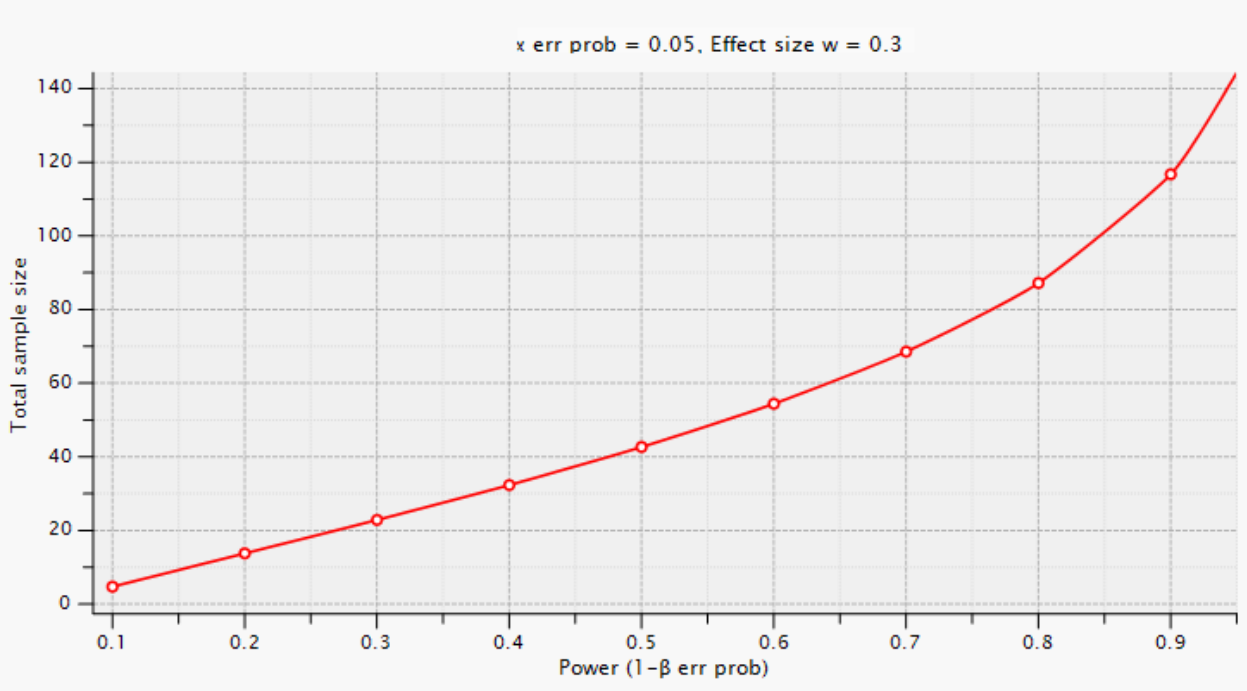


Figure 1. *Power Analysis*

Despite these limitations, results from this study provide a compelling basis for future research on the ways in which treatment components can be introduced into non-treatment settings and more specifically, how treatment reminder cues may be able to provide a non-intrusive, cost-efficient, and effective tool to do so. An area for future research is the utility of combining treatment reminder cues with other electronic strategies in order to a) prevent or delay relapse, and b) notify treatment providers of a client's impeding likelihood of relapsing. A study recently published by Moore et al. (2013) found that participants who experienced a sudden increase in cravings were 14 times more likely to relapse than those who did not report such an increase. Results also showed that those who reported lower average cravings throughout the study were more likely to relapse following a sudden increase in cravings than were individuals who reported higher but more steady cravings. Although in the present study we did not find significant differences in average ratings of cravings among those who relapsed versus those who did not, an important future study is one that delineates the effects of treatment reminder cues on cravings prior to self-reported relapse to determine whether exposure to cues may lessen average cravings or reduce the intensity of sudden spikes. The Moore et al. (2013) study also found that those experiencing increases in negative affect were more likely to relapse than those without such increases. Although in the present study we did not find that baseline levels of positive and negative affect were significantly associated with relapse, we did not examine fluctuations in affect throughout the study and did to assess for a temporal association between affect and relapse. Future studies should assess for changes in affect throughout the study in order to examine the effects of reminder cues on reducing negative affect and their combined effect on relapse.

Furthermore, the direction of substance use treatment specifically, but also of mental health treatment in general, is headed towards an integration of technological advances in not only the treatment of disorders, but also in their timely identification and prevention. Using handheld devices allows for real-time information regarding the well-being of a client and allows for timely notification for preventative action. Understanding the temporal connection between proximal variables and relapse, as well as the utility of treatment reminder cues in reducing their intensity will allow providers to engage in appropriate action between the moment cravings are reported and before a patient can re-engage in substance use. Furthermore, treatment reminder cues are not limited to handheld computers. Future research should examine their utility when administered via text messages on mobile phones or via electronic mail. The ultimate goal of this line of research is to identify an effective strategy to reduce or delay relapse that is easy to administer, cost efficient, available to a wide variety of clients regardless of socioeconomic status or life circumstance, and is able to reach patients who are not actively engaged in treatment or those individuals who may otherwise not want to or be able to engage in formal treatment at all.

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Appendices

Appendix A

Daily Diary Questionnaire

(**Perceived Stress**)

1. In the last 24 hours, how often have you felt that you were unable to control the important things in your life?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

2. In the last 24 hours, how often have you felt nervous or "stressed"?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

3. In the last 24 hours, how often have you felt that you were effectively coping with important changes that were occurring in your life?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

4. In the last 24 hours, how often have you felt confident about your ability to handle your personal problems?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

5. In the last 24 hours, how often have you felt that things were going your way?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

6. In the last 24 hours, how often have you found that you could not cope with all the things that you had to do?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

7. In the last 24 hours, how often have you found yourself thinking about things that you have to accomplish?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

8. In the last 24 hours, how often have you felt difficulties were piling up so high that you could not overcome them?

0	1	2	3	4
Never	almost never	sometimes	fairly often	very often

(**Craving**)

1. In the last 24 hours, how strong was your strongest craving or desire for alcohol/drugs?

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

(If score 2 or higher)
1a. At what time did you first notice the craving? (clock display will be presented)
1b. At what time was the craving strongest?
1c. At what time did the craving stop or mostly go away?

1d. Please indicate the primary or strongest trigger for the craving.

Bad Mood	Stress	Good Mood	Boredom
Relaxing	Eating	Bar	Out of Nowhere
Someone talking about alcohol/drugs			Fatigue/Tired
Argument/disagreement with someone			Physical Pain

1e. Please mark all the triggers involved in the craving.

Bad Mood	Stress	Good Mood	Boredom
Relaxing	Eating	Bar	Out of Nowhere
Someone talking about alcohol/drugs			Fatigue/Tired
Argument/disagreement with someone			Physical Pain

(**Interpersonal Conflict**)

1. In the last 24 hours, did you have a conflict, argument, or fight with anyone?

Yes / No

1a. If yes, how many conflicts did you experience in the last 24 hours?

1b. With which person did you experience the worst or most stressful/difficult conflict?

Intimate Partner	Friend	Fellow Patient(s)	Counselor
Father	Mother	Sibling	Child

1c. Thinking about the worst or most difficult conflict? At what time did this conflict start?
1d. At what time did the conflict end?
1e. Did you experience a craving for alcohol/drugs as a result of this conflict? Yes / No
1f. How strong was the craving?

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

(Substance use)

1. In the last 24 hours, did you drink alcohol?

Yes / No

1a. If yes, what time did you have your first drink?

1b. If yes, how many drinks did you consume?

1, 2, 3……50

1c. If yes, at what time was your last drink?

1d. Please indicate the primary or strongest trigger for using alcohol.

Bad Mood	Stress	Good Mood	Boredom
Relaxing	Eating	Bar	Out of Nowhere
Someone talking about alcohol/drugs			Fatigue/Tired
Argument/disagreement with someone			Physical Pain

1e. Please mark all the triggers involved in deciding to use alcohol.

Bad Mood	Stress	Good Mood	Boredom
Relaxing	Eating	Bar	Out of Nowhere
Someone talking about alcohol/drugs			Fatigue/Tired
Argument/disagreement with someone			Physical Pain

2. In the last 24 hours, did you use any of the following drugs? Select all that apply

Marijuana / Cocaine / Hallucinogens / Stimulants / Opiates /
Sedatives/Hypnotics (e.g., amobarbital, lorazepam) /
Anxiolytics (e.g., Xanax, Valium, Ativan) / Other / Did not use

2a. If yes, what time did you start using _____? (will repeat for each drug used)

2b. If yes, at what time did you stop using _____?

2c. Please indicate the primary or strongest trigger for using _____.

Bad Mood	Stress	Good Mood	Boredom
Relaxing	Eating	Bar	Out of Nowhere
Someone talking about alcohol/drugs			Fatigue/Tired
Argument/disagreement with someone			Physical Pain

2d. Please mark all the triggers involved in deciding to use _____.

Bad Mood	Stress	Good Mood	Boredom
Relaxing	Eating	Bar	Out of Nowhere
Someone talking about alcohol/drugs			Fatigue/Tired
Argument/disagreement with someone			Physical Pain

(Motivation/Self-Efficacy)

1. For the last 24 hours, please indicate the extent to which you felt that maintaining abstinence was important to you.

1	2	3	4	5
Not at all Important	A little Important	Moderately Important	Quite Important	Very Important

2. How confident are you in your ability to maintain abstinence during the next 24 hours?

1	2	3	4	5
Not at all Confident	A little Confident	Moderately Confident	Quite Confident	Very Confident

(**Perceived Criticism**)

1. In the last 24 hours, how critical do you think your spouse (or current partner) was of you?

Not at all Critical				Moderately Critical					Very Critical Indeed
1	2	3	4	5	6	7	8	9	10

2. In the last 24 hours, how critical do you think you were of your spouse (or current partner)?

Not at all Critical				Moderately Critical					Very Critical Indeed
1	2	3	4	5	6	7	8	9	10

3. In the last 24 hours, how critical do you think your counselors were of you?

Not at all Critical				Moderately Critical					Very Critical Indeed
1	2	3	4	5	6	7	8	9	10

4. In the last 24 hours, how critical do you think you were of your counselors?

Not at all Critical				Moderately Critical					Very Critical Indeed
1	2	3	4	5	6	7	8	9	10

Appendix B

Database of Treatment Reminder Cues

Slow down and breathe.
Don't get too far ahead of yourself.
Easy does it.
Are you working on your steps to recovery?
Keep it simple.
It is what it is.
Acceptance is the key to all my problems.
I need to stop and pray.
It is time to slow down.
Take care of yourself first.
Take time to meditate.
Have you done a 10th step today?
Have you called your sponsor?
Have you been grateful today?
Have you talked to an addict today?
The first thing I put in front of my recovery is the first thing that I will lose.
Be careful not to dwell on your past because it will become your future.
You are in recovery; or you are in relapse.
If you are not working on your recovery, your addiction is working on a relapse.
Surrender
Don't use, no matter what.
If I keep doing what I always did, I'll keep getting what I always got.
Have hope.
Remember to stay open-minded.
Did you pray today?
Play the tape all the way through.
Yesterday is history, tomorrow is a mystery, today is a present.
Remember what it was like before coming here.
Have you practiced spiritual principles?
1 is too many and 1000 are never enough.
What are you willing to do for your recovery?
Have you been to a meeting?
You can only change one thing: Everything.
Have you read from the Big Book?
Live just for today.
In order to keep it, did you give it away?
Stay in the moment.
Any life run on self-will can hardly be a success.
Take action.
Have you done a self inventory?
Resentment is the number one offender.
If you are not honest with yourself, you cannot be honest with others.

How far are you willing to go for victory over your addiction?
The spiritual life is not just a theory. You have to live it.
Live and let live.
Unity, recovery, and service.
Surrender to become Victorious.
Be of maximum service to others.
When the pain of staying sober becomes less than the pain of getting drunk/high, you'll stay sober.
We'll love you, until you learn to love yourself.
90 meetings in 90 days.
Write a gratitude list and count your blessings.
Faith chases away fear.
A drug is a drug.
You can talk the talk, but can you walk the walk?
Live life on life's terms. Keep coming back, it works if you work it.
Death, insanity, or recovery.
Today "I" have a choice.
I didn't get into trouble every time I used, but every time I got in trouble I was using.
I came, I came to, I came to believe.
Insanity is defined as doing the same thing over, and over again, expecting different results.
We are without defense against the first use, our defense must come from a power greater than ourselves.
Don't work my program, or your program, work "the program".
If you want what we have and you're willing to go to any lengths to get it.
The addict's mind is like a bad neighborhood, don't go there alone.
Gratitude, that's the attitude.
Faith without work is dead.
Get to the meeting early and go to the meeting after the meeting.
My worst day sober is better than my best day drunk/high.
Half measures availed us nothing.
None of us came here on a winning streak.
This too shall pass.
Once an addict always an addict.
I might have another drunk left in me, but do I have another recovery?
H.A.L.T. - Hungry, angry, lonely, tired.
F.E.A.R. – Face everything and recover.
Nothing changes if nothing changes.
H.O.W. - Honesty, open mindedness, willingness.
Take what you need and leave the rest.
It's the journey not the destination.
God will never give you more then you can handle.
Learn to listen and listen to learn.
Never alone, never again.
If you expect respect, be the first to show some.
Serenity is not freedom from the storm but peace amid the storm.
Keep coming back.

Resentment is like drinking poison and expecting someone else to die.
You only get out of it what you put into it.
An addict alone is in bad company.
Humility is not thinking less of myself but thinking of myself less.

Appendix C

Consent for Participation in a Research Project

Invitation to Participate and Description of Project

You are invited to participate in a research study designed to examine the effects of treatment reminder cues, and to assess your mood, cravings, interpersonal experiences and substance use while completing a substance use treatment program. You have been invited to participate because you are completing an outpatient substance use treatment program, are at least 18 years old, speak English, and are living at the facility while completing the treatment. Your participation in the study will last approximately 90 minutes today and up to 10 minutes each day for one month. Participation will involve completing a packet of questionnaires today, followed by training in using a hand-held computer to answer a few questions each day for one month while you complete your treatment. You will also be asked to meet with a member of the research team each week and in one month to return the hand-held computer.

In order to decide whether or not you wish to be a part of this research study, you should know enough about its risks and benefits to make an informed judgment. This consent form gives you detailed information about the research study which a member of the research team will discuss with you. This discussion should go over all aspects of this research: its purpose, the procedures that will be performed, any risks of the procedures, possible benefits and possible alternative treatments. Once you understand the study, you will be asked if you wish to participate; if so, you will be asked to sign this form.

Description of Procedures

If you decide to participate, you will be asked to complete confidential questionnaires regarding thoughts, feelings, and behaviors in relation to a number of areas, including mood, substance use, and how you handle conflict in relationships. None of the information that you provide will be shared with Cornerstone. After you complete the questionnaires, you will meet with someone from the research team to receive 30 minutes of training in responding to treatment reminder cues and in answering questions about mood, cravings, conflicts with other people, and substance use on a hand-held computer. The purpose of this study is to use treatment reminder cues to extend the effects of treatment to other non-treatment contexts, as well as to better understand the daily experiences of men and women completing a substance use treatment program. You will be asked to keep the handheld computer with you to answer a few questions each day, send us your answers via wireless communication, meet with the researcher weekly to collect your compensation, and to return in one month so that we can collect the computer. We will also collect data from Cornerstone about you, such as your intake assessment battery and results from drug screens. However, we will not share any information about you with anyone at Cornerstone. We will also ask you to provide contact information so that we can locate you for the follow-up meeting in one month.

Risks and Inconveniences

A risk of study participation is the possibility that providing information about mood, substance use and conflicts with others will be upsetting to you. You may decide to end your participation in the study at any time. Another potential risk is the loss of confidentiality. Although none of the information you might share regarding your mood, conflict, or substance

use will be shared with anyone, including counselors and staff at Cornerstone, your name will be linked to the information you provide until the study is completed. To ensure that the information you provide us remains confidential, it will be identified with a numeric code only and stored in a locked file cabinet at the University of Tennessee. Only the research team will be able to connect your name with your information during the study, and this will be used only for the purpose of contacting you for the follow-up session. Once the study is complete, the file linking your name with your information will be destroyed. In addition, only your numeric code and not your name will be used on the hand-held computers and neither you nor other people will be able to access your daily computer responses at anytime.

Confidentiality cannot be protected if child or elder abuse is suspected or reported. Tennessee law does not require that we report illegal substance use or incidents of past conflict or aggression between two adults, but we will need to inform the proper authorities if you or someone else is in imminent danger of being injured or abused.

Benefits

A small benefit to this study is that participants will be able to use the various programs on the hand-held computer throughout the duration of the study. Participants also have a chance to contribute to a scientific study that may help people in the future. In addition, if participants wish to be given referrals for additional counseling, a referral list is available upon request.

Economic Considerations

All participants will be paid $5 for completing the packet of questionnaires at the beginning of the study. Participants will be paid up to $3.00 for each day they respond to treatment reminder cues and diary questions. Finally, participants will be paid $5 for returning the hand-held computer at the end of the study and completing the follow-up. However, participants who withdraw from the study without returning the hand-held computer, return for the follow-up assessment without the hand-held computer (because it was lost, stolen, etc.), or return with a computer that has clearly been damaged will only receive compensation for responses to treatment reminder cues and daily surveys already received by the research team. Therefore, participants are strongly encouraged to take care of the hand-held computers, lock them in a secure place, and to notify research staff immediately if the device malfunctions in order to arrange a replacement device.

Alternative Treatments

In case of any discomfort from participating in this study, you can expect to receive the following treatment or care which will be sought after by you and provided at your expense: assistance from the UT Psychological Clinic (974-2161). In addition, a referral list is available upon request for treatment centers not affiliated with the university.

Confidentiality

To ensure that the information you provide us remains confidential, the data you provide will be identified with a numeric code only and stored in a locked file cabinet. You will not be personally identified in any reports or publications that may result from this study. None of the information you provide us will be shared with anyone, including your counselors at Cornerstone. The only exception to confidentiality is the duty to notify the appropriate

authorities in compliance with state law if we become aware of the possibility of a participant posing an imminent risk to him or herself or another, or if we become aware of the possibility that child maltreatment is occurring. You may choose not to answer particular items on a questionnaire or on the hand-held computers that you consider sensitive information or which may place you at risk.

Voluntary Participation

You are free to decide whether or not to participate in this study, and you are free to withdraw from the study at any time by informing the researchers and returning the handheld computer. While withdrawing from the study at anytime will not result in any penalties, you will not receive monetary compensation unless you return the handheld computer undamaged.

Authorization: I have read the above information and have received a copy of this form. The purpose and the risk of this study have been explained to me. I agree to participate in this study.

_____	_____	_____
Participant's Signature	Printed Name	Date

_____	_____
Signature of Principal Investigator or person obtaining consent	Telephone

If you have further questions about this project, please contact Kathrin Ritter at (865) 974-8711. For research-related problems or questions regarding subjects' rights, the Institutional Review Board may be contacted through the Compliance Office at 974-3466.

Appendix D

Screening Questionnaire

1. What is the patient's age? _____ (must be at least 18)

2. For what substance(s) is the patient seeking treatment? _____ (must be at least one drug other than caffeine or nicotine)

3. Does patient speak English? _____

Ask patients the following questions to determine whether he/she meets criteria for a psychotic disorder. Exclude patient if they endorse 1 or more items.

During the past two weeks……

1. Did things happen that you knew were true, but that other people told you were your imagination?

2. Were you convinced that other people were watching you, talking about you, or spying on you?

3. Did you think that you were in danger because someone was plotting to hurt you?

4. Did you think that you had special powers other people didn't have?

5. Did you think that some outside force or power was controlling your body or mind?

6. Did you hear voices that other people didn't hear, or see things that other people didn't see?

Appendix E

Demographic Questionnaire

1. Age:_____

2. Sex/Gender: Female / Male

3. Educational Background: Circle Highest Achieved
   1. Less than high school diploma
   2. High school graduate
   3. Attended college/professionals school
   4. Bachelor's degree
   5. Medical/Graduate degree

4. Ethnic/Racial Background: Circle all that apply
   1. White/Caucasian
   2. Black/African-American
   3. Hispanic/Latino
   4. Asian-American
   5. Native American
   6. Indian/Middle Eastern
   7. Other (please list):_____

5. Religious Background/Affiliation: Circle all that apply
   1. Catholic
   2. Christian
   3. Jewish
   4. Muslim
   5. Buddhist
   6. Hindi
   7. Other:_____

6. Income Level: Circle One
   1. Less than $25,000
   2. $25,001 - $50,000
   3. $50,001 - $100,000
   4. $100,001 - $150,000
   5. Greater than $150,000

7. Employment Status:
   1. Unemployed/on disability
   2. Employed part-time
   3. Employed full-time

8. What is your current marital status?
   1. Single
   2. Dating
   3. Married
   4. Separated
   5. Divorced
   6. Widowed

9. If you are currently dating someone or are married, how long have you been with this person?
   total number of MONTHS together _____

10. Sexual Orientation: Heterosexual / Gay / Lesbian / Bisexual

11. If you answered "bisexual" to question 10 AND you are currently dating someone, what is the gender of your current dating partner? Male / Female

Appendix F

Structured Clinical Interview for DSM-IV

SCID - Cornerstone

1) What substan_____

Now I'd like to ask some questions about any alcohol use:

2) When in your life were you drinking the most?

3) How often were you drinking?

How much were you drinking?

Did your drinking cause problems for you?

Did anyone object to your drinking?

DEPENDENCE LIKELY? If YES, _____TURN TO PAGE 2

IF DEPENDENCE UNLIKELY, IS ABUSE LIKELY? If YES, ___TURN TO PAGE 4.
If NO, turn to PAGE 6 for drug dependence

Alcohol DEPENDENCE

I'd now like to ask some more questions about the time when you were drinking the most or had the most problems…

	1 =False 2 = Subthreshold 3 = True
4) Did you often find that when you started drinking you ended up drinking much more or for a longer period of time than you were planning to? (i.e., is alcohol taken in larger amounts or over a longer period than was intended)	1 2 3
5) Did you try to cut down or stop drinking alcohol? (i.e., is there a persistent desire or unsuccessful efforts to control use)	1 2 3
IF YES: Did you ever stop altogether? How many times did you try?	
IF NO: Did you ever try to cut down or stop drinking/ or experience a persistent desire to control your drinking habits?	
6) Did you spend a lot of time drinking, being high, or hung over? (Was there a lot of time spent in activities to obtain alcohol?)	1 2 3
7) Did you have times when you would drink so often that you started to drink instead of working or spending time at hobbies or with your family or friends, or engaging in other important activities, such as sports, gardening, or playing music?	1 2 3
8) Did your drinking ever cause any psychological problems like making you depressed or anxious, making it difficult to sleep, or causing "blackouts?"	1 2 3
Did your drinking cause significant physical problems or make a physical problem worse?	
(Did you keep drinking anyway?)	

9) Did you find that you needed to drink a lot more in order to get the feeling you wanted than you did when you first started drinking? 1 2 3
(i.e., tolerance)

IF YES: How much more?
IF NO: What about finding that when you drank the same amount, it had much less effect than before?

10) Did you have any withdrawal symptoms when you cut down or stopped drinking? 1 2 3
(at least two of the following: sweating or racing heart, handshakes, trouble sleeping, nausea or vomiting, feeling agitated, psychomotor agitation, anxiety, autonomic hyperactivity, increased hand tremor, add?)

How about having a seizure or seeing, feeling or hearing things that weren't really there?

IF NO: Would you start the day with a drink to avoid to keep yourself from getting the shakes or becoming sick?

Chronology for Alcohol DEPENDENCE

11) AT LEAST 3 DEPENDENCE ITEMS CODED "3" during same 12 month period ? 1 3

12) Age of onset _____

13) Current dependence? (Month previous to entering treatment) 1 3

IF CRITERIA NOT MET GO TO ABUSE PAGE 5

IF CRITERIA FOR "CURRENT DEPENDENCE" MET, SKIP TO DRUG USE PAGE 6

IF CRITERIA MET ONLY FOR "LIFETIME DEPENDENCE" GO TO REMISSION SPECIFIERS BELOW

14) *Remission Specifiers* *1* *2* *3* *4*

1- Early Full Remission:
For at least 1 month, but less than 12 months, no criteria have been met

2. Early Partial Remission
For at least 1 month but less than 12 months, 1 or more criteria have been met

3. Sustained Full Remission
No criteria have been met for 12 months or longer

4. Sustained Partial Remission
Full criteria not met for 12 months or longer, but 1 or more criteria have been met

15) Type: 1- With Physiological Dependence (tolerance or withdrawal) 1 2

2- Without Physiological Dependence

16) To what degree has your alcohol use interfered with your life 1 2 3

1- Mild: Few, if any, symptoms in excess of those required to make the diagnosis and the symptoms result in no more than mild impairment in occupational functioning or in usual social activities or relationships with others.

2- Moderate: Symptoms or functional impairment between mild and severe

3- Severe: Many symptoms in excess of those required to make the diagnosis, and the symptoms markedly interfere with occupational functioning or with usual social activities or relationships with others.

Alcohol ABUSE

17) Did you ever miss work or school because you were intoxicated, high or very hung over? What about keeping your house clean or fulfilling other responsibilities like schoolwork or caring for kids? (i.e., failure to fulfill major role obligations)	1	2	3
18) Did you ever drink in a situation in which it might have been dangerous to drink at all? How often? (ex: drinking and driving, operating machinery, caring for patients) (Recurrent use in dangerous situations required for this criteria)	1	2	3
19) Did your drinking ever get you in trouble with the law? How often? (Recurrent problems, not just one)	1	2	3
20) Did your drinking cause problems with other people, such as family members, friends or people at work? (Did you ever get into physical fights or bad argument when you were drinking?) Did you keep drinking anyway?	1	2	3
21) AT LEAST ONE ITEM CODED 3?	1		3
22) Age of onset of ABUSE? _____			
23) Current ABUSE? (Month previous to treatment)	1		3

Non-Alcohol Substance Use Disorders

Sedative-hypnotics:

What ages?_____

How often?_____

Lifetime Current

Cannabis

What ages?_____

How often?_____

Lifetime Current

Stimulants

What ages?_____

How often?_____

Lifetime Current

Opioids

What ages?_____

How often?_____

Lifetime Current

Cocaine

What ages?_____

How often?_____

Lifetime Current

Hallucinogens

What ages?_____

How often?_____

Lifetime Current

Other

What ages?_____

How often?_____

Lifetime Current

DEPENDENCE LIKELY? Go on to PAGE 8

IF DEPENDENCE UNLIKELY, IS ABUSE LIKELY?___ TURN TO PAGE 14

Non- Alcohol Substance DEPENDENCE

I'd now like to ask you about the time when you were using the most drugs or drugs caused the most problems for you:

25) Did you often find that when you started using you ended up using more of it than you were planning to?

(i.e., is drug taken in larger amounts or over a longer period than was intended)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

26) Did you try to cut down or stop using the drug How many times?

(i.e., persistent desire or unsuccessful efforts to cut down or control use)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

27) Did you spend a lot of time using or doing whatever you had to do to get it, or recovering from the effects of the drug?

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

28) Did you often have times when you would use so often that you used instead of working or spending time with your family or friends or engaging in other important activities?
(i.e. important social, occupation, or recreational activities given up or reduced because of use)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

29) Did your use ever cause any psychological problems like making you depressed, agitated or paranoid?

IF NO, Did it cause any physical problems or make a physical problem worse?

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

30) Did you find that you needed to use a lot more in order to get the feeling you wanted than you did when you first started using it?
(i.e., tolerance)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

31) Did you have any withdrawal symptoms when you cut down or stopped using?
(at least two of the following: sweating or racing heart, handshakes,
trouble sleeping, nausea or vomiting, feeling agitated, psychomotor agitation, anxiety,
autonomic hyperactivity, increased hand tremor)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

32) At least 3 dependence items endorsed during same 12 month period? (Poly = 3 or more drugs at the same time) 3= Yes, 1 = No

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
3	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1

33) Age of Onset of DEPENDENCE?

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
____	_____	_____	_____	_____	_____	_____	____

34) Meets criteria for current Dependence? (Used within month prior to entering treatment)
3= Yes, 1 = No

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
3	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1

IF CRITERIA MET ***ONLY*** FOR "LIFETIME DEPENDENCE" GO TO REMISSION SPECIFIERS BELOW…

43) *Remission Specifiers*

1- Early Full Remission:
For at least 1 month, but less than 12 months, no criteria have been met

2. Early Partial Remission
For at least 1 month but less than 12 months, 1 or more criteria have been met

3. Sustained Full Remission
No criteria have been met for 12 months or longer

4. Sustained Partial Remission
Full criteria not met for 12 months or longer, but 1 or more criteria have been met

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
4	4	4	4	4	4	4	4
3	3	3	3	3	3	3	3
2	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1

44) Type:

1- With Physiological Dependence (experienced tolerance or withdrawal)

2- Without Physiological Dependence

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
2	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1

45) To what degree has your drug use interfered with your life?

1- Mild: Few, if any, symptoms in excess of those required to make the diagnosis and the symptoms result in no more than mild impairment in occupational functioning or in usual social activities or relationships with others.

2- Moderate: Symptoms or functional impairment between mild and severe

3- Severe: Many symptoms in excess of those required to make the diagnosis, and the symptoms markedly interfere with occupational functioning or with usual social activities or relationships with others.

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
3	3	3	3	3	3	3	3
2	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1

For any items that do not meet criteria for dependence, go on to ABUSE PAGE 14

Non-Alcohol Substance ABUSE

36) Did you ever miss work or school because you were intoxicated, high or very hung over?

What about keeping your house clean or fulfilling other responsibilities like schoolwork or caring for kids? (i.e., failure to fulfill major role obligations)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

37) Did you ever use in a situation in which it might have been dangerous to use at all? How often? (ex: recurrent using and driving, operating machinery, caring for patients)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

38) Did your drug use ever get you in trouble with the law? How often? (recurrent problems with the law)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

39) Did your use cause problems with other people, such as family members, friends or people at work? Did you ever get into physical fights or bad argument when you were using? Did you keep using anyway?

SED	CANN	STIM	OPIOID	COC	HALL	OTHR
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

40) Meets criteria for ABUSE? (a.k.a. For each drug category, at least one question scored a 3)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
3	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1

41) Age of Onset of ABUSE?

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
___	___	___	___	___	___	___	___

42) Substance ABUSE current? (Month previous to entering treatment)

SED	CANN	STIM	OPIOID	COC	HALL	OTHR	POLY
3	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1

Appendix G

Alcohol Use Disorders Identification Test (AUDIT)

The following questions ask about your use of alcoholic beverages during the 6 months before you started treatment. For the following questions, 1 standard drink equals one can, glass, or 12 ounce bottle of beer, one shot of liquor or mixed drink, or one glass of wine. Circle the answer below each item that best describes you.

1. How often do you have a drink containing alcohol?

Never
Monthly or Less
2 to 4 times a month
2 to 3 times a week
4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

0, 1 or 2
3 or 4
5 or 6
7 to 9
10 or more

3. How often do you have 4 (for women) / 5 (for men) or more drinks on one occasion?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

4. How often during the past 6 months have you found that you were not able to stop drinking once you had started?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

5. How often during the past 6 months have you failed to do what was normally expected from you because of drinking?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

6. How often during the past 6 months have you needed a drink first thing in the morning to get yourself going after a heavy drinking session?

Never

Less than monthly
Monthly
Weekly
Daily or almost daily

7. How often during the past 6 months have you had a feeling of guilt or remorse after drinking?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

8. How often during the past 6 months have you been unable to remember what happened the night before because you had been drinking?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

9. In the past 6 months, have you or someone else been injured as a result of your drinking?

No
Yes, but not in the last six months
Yes, during the last six months

10. In the past 6 months, has a relative, friend, doctor, or other health worker been concerned about your drinking or suggested you cut down?

No
Yes, but not in the last six months
Yes, during the last six months

11. Now think of all kinds of alcoholic beverages combined, that is - any combination of cans of beer, glasses of wine, or drinks containing liquor of any kind. During the past 6 months, what is the largest number of drinks you had on any single day? _____

12. How often during the past 6 months did you become intoxicated or drunk from drinking any kind of beverage containing alcohol, whether it was wine, beer, whiskey, or any other drink?

Never
Less than monthly
About once a month
Several times a month
1-2 days a week
3-4 days a week
5-6 days a week
Every day

Appendix H

Drug Use Disorders Identification Test (DUDIT)

The following questions ask about your <u>use of drugs during the 6 months before you started treatment</u>. Please circle the answer that best describes you.

During the past 6 months:

1. About how often do you use cannabis (for example, hash, pot, marijuana, THC, or other)?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

2. About how often do you use cocaine (for example, intranasal, IV, crack, freebase, "speedball," or other)?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

3. About how often do you use hallucinogens / PCP (for example, LSD, mescaline, peyote, psilocybin, STP, mushrooms, PCP, "angel dust," Extasy, MDMA, or other)?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

4. About how often do you use stimulants that were not prescribed for you by a doctor (for example, amphetamine, "speed," crystal meth, dexadrine, Ritalin, "ice," or other)?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

5. About how often do you use sedatives, hypnotics, or anxiolytics that were not prescribed for you by a doctor (for example, Xanax, Quaaludes, Valium, Librium, barbiturates, Miltown, Ativan, Dalmane, Halcion, Restoril, Seconal, or other)?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

6. About how often do you use opiates that were not prescribed for you by a doctor (for example, heroin, morphine, Oxycontin, Hydrocodone, opium, Methadone, codeine, Demerol, Darvon, Percodan, Dilaudid, or other)?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

7. About how often do you use other substances, such as steroids, glue, gasoline, paint, inhalants, nitrous oxide, "laughing gas," amyl or butyl nitrate, "poppers," nonprescription sleep or diet pills, unknown, or other?

Never
Less than monthly
Monthly
2-3 times a month
Weekly
2 to 3 times a week
4 or more times a week

8. How often during the past 6 months have you found that you were not able to stop using drugs once you had started?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

9. How often during the past 6 months have you failed to do what was normally expected from you because of your drug use?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

10. How often during the past 6 months have you had a feeling of guilt or remorse after using drugs?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

11. How often during the past 6 months have you been unable to remember what happened the night before because you had been using drugs?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

12. How often during the past 6 months have you used drugs to keep yourself from experiencing withdrawal symptoms?

Never
Less than monthly
Monthly
Weekly
Daily or almost daily

13. In the past 6 months, have you or someone else been injured as a result of your drug use?

No
Yes, but not in the last six months
Yes, during the last six months

14. In the past 6 months, has a relative or friend, or a doctor or other health worker been concerned about your drug use or suggested you cut down or stop?

No
Yes, but not in the last six months
Yes, during the last six months

Appendix I

Social Support Questionnaire

INSTRUCTIONS:
The following questions ask about people in your environment who provide you with help or support. Each question has two parts. For the first part, list all people you know, excluding yourself, whom you can count on for help or support in the manner described. Give the person's initials and their relationship to you (see example). Do not list more than one person next to each of the letters beneath the question.

For the second part, circle how satisfied you are with the overall support you have.
If you have no support for a question, check the words "No one," but still rate your level of satisfaction. Do not list more than nine persons per question.

Please answer all questions as best you can. All your responses will be kept confidential.

EXAMPLE:
Who do you know whom you can trust with information that could get you in trouble?

No one

1) T.N. (brother)	4) T.N. (father)	7)
2) L.M. (friend)	5) L.M. (employer)	8)
3) R.S. (friend)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

1. Whom can you really count on to listen to you when you need to talk?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

2. Whom could you really count on to help you if a person whom you thought was a good friend insulted you and told you that he/she didn't want to see you again?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

3. Whose lives do you feel that you are an important part of?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

4. Whom do you feel would help you if you were married and had just separated from your spouse?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

5. Whom could you really count on to help you out in a crisis situation, even though they would have to go out of their way to do so?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

6. Whom can you talk with frankly, without having to watch what you say?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

7. Who helps you feel that you truly have something positive to contribute to others?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

8. Whom can you really count on to distract you from your worries when you feel under stress?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

9. Whom can you really count on to be dependable when you need help?

No one

1)	4)	7)

2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

10. Whom could you really count on to help you out if you had just been fired from your job or expelled from school?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

11. With whom can you totally be yourself?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

12. Whom do you feel really appreciates you as a person?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

13. Whom can you really count on to give you useful suggestions that help you to avoid making mistakes?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

14. Whom can you count on to listen openly and uncritically to your innermost feelings?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

15. Who will comfort you when you need it by holding you in their arms?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

16. Whom do you feel would help if a good friend of yours had been in a car accident and was hospitalized in serious condition?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

17. Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

18. Whom do you feel would help if a family member very close to you died?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

19. Who accepts you totally, including both your worst and best points?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

20. Whom can you really count on to care about you, regardless of what is happening to you?

No one

1)	4)	7)
2)	5)	8)

3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

21. Whom can you really count on to listen to you when you are very angry at someone else?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

22. Whom can you really count on to tell you, in a thoughtful manner, when you need to improve in some way?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

23. Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

No one

1)	4)	7)
2)	5)	8)
3)	6)	9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

24. Whom do you feel truly loves you deeply?

No one
1) 4) 7)
2) 5) 8)
3) 6) 9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

25. Whom can you count on to console you when you are very upset?

No one
1) 4) 7)
2) 5) 8)
3) 6) 9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

26. Whom can you really count on to support you in major decisions you make?

No one
1) 4) 7)
2) 5) 8)
3) 6) 9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

27. Whom can you really count on to help you feel better when you are very irritable, ready to get angry at almost anything?

No one
1) 4) 7)
2) 5) 8)
3) 6) 9)

How satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

Appendix J

Positive and Negative Affect Scales

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on average. Use the following scale to record your answers.

1	2	3	4	5
Very slightly Or not at all	A little	Moderately	Quite a bit	Extremely

_____ interested	_____ irritable	_____ distressed	_____ alert
_____ excited	_____ ashamed	_____ upset	_____ inspired
_____ strong	_____ nervous	_____ guilty	_____ determined
_____ scared	_____ attentive	_____ hostile	_____ jittery
_____ enthusiastic	_____ active	_____ proud	_____ afraid

Vita

Kathrin Ritter was born in Germany to parents Frank and Christine Ritter. She has a twin brother, Alexander. She graduated from Christ Church Episcopal High School in Greenville, South Carolina in 2003. She then earned a Bachelor of Arts Degree in Psychology from Northeastern University in 2007. She graduated with Suma Cum Laude Honors and received recognition for her undergraduate research in language acquisition. She subsequently attended Appalachian State University to obtain her Master of Arts Degree in Clinical Health Psychology. In fulfillment of program requirements at Appalachian State University, Kathrin completed her internship at John F. Warren and Associates and at the Appalachian State University Psychology Clinic, focusing on psychological assessments. Kathrin presented a poster in Kansas City at the Kansas Conference in Clinical Child and Adolescent Psychology: Translating Research into Practice, and received co-authorship in *The Journal of Contemporary Psychology* for her work on an article entitled Using the MMPI-2 to Predict Symptom Reduction during Psychotherapy in a Sample of Community Outpatients. She graduated with Suma Cum Laude Honors in 2009 after which she enrolled at the University of Tennessee, Knoxville to obtain her Ph.D. in Clinical Psychology.

During her tenure at UT, Kathrin has participated in a number of research and clinical endeavors. She served as principal graduate student researcher on a large grant-funded project examining the effects of cravings and affect on rates of relapse. She has applied for grant funding for her own project and prepared a full grant submission that was scored very well. She also led and co-led a number of independent projects, many of which have resulted in publications. Overall, she has obtained four peer reviewed publications, one first-author book chapter, a number of encyclopedia entries, and has participated in numerous poster presentations.

Clinically, she worked at the Psychological Clinic conducting psychological assessments and therapy with a wide variety of patients. Her area of expertise is in the assessment of court-related issues. She also enjoys supervising peers in areas of assessment, case conceptualization, and report writing. She has worked at a large Government agency conducting program outcome research and fitness for duty evaluations. She taught a number of courses in Introduction to Psychology and Abnormal Psychology at both UT and another local University. Currently, she is completing an out-of-state placement collaborating with researchers at the University of Florida. She also serves as administrator to UT's online research portal. She has applied for internship and will attend the North Florida/South Georgia Veterans Health System as part of their 2014-2105 intern class. Following her internship, Kathrin plans to obtain a post-doc placement and eventually teach and conduct research at a large University.