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Distress Tolerance Treatment for Early-Lapse Smokers:

Rationale, Program Description, and Preliminary Findings

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Abstract

A significant percentage of individuals attempting smoking cessation lapse within a matter of days, and very few are able to recover to achieve long-term abstinence. This observation suggests that many smokers may have quit-attempt histories characterized exclusively by early lapses to smoking following quit attempts. Recent negative-reinforcement conceptualizations of early lapse to smoking suggest that individuals' reactions to withdrawal and inability to tolerate the experience of these symptoms, rather than withdrawal severity itself, may represent an important treatment target in the development of new behavioral interventions for this subpopulation of smokers. This article presents the theoretical rationale and describes a novel, multicomponent distress-tolerance treatment for early-lapse smokers that incorporates behavioral and pharmacological elements of standard smoking-cessation treatment, whereas drawing distress-tolerance elements from exposure-based and Acceptance and Commitment Therapy–based treatment approaches. Preliminary data from a pilot study (N = 16) are presented, and clinical implications are discussed.

Keywords

smoking cessation; distress tolerance; acceptance

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Smoking continues to be the leading cause of preventable death in the United States, with smoking-related illnesses accounting for approximately 440,000 deaths per year (U.S. Department of Health and Human Services [USDHHS], 2004). Fortunately, advances in smoking-cessation interventions have been effective in helping many smokers quit, with long-term (12-month follow-up) abstinence rates around 25% to 30% (Fiore, Bailey, & Cohen, 2000). However, there has been a slowing in the rate of decline in smoking prevalence over the past several years (Centers for Disease Control and Prevention, 2005). Some experts have suggested that this diminished efficacy of prevention and cessation efforts may be related to changes in the demographics of current smokers (Hughes, 1996). That is, there seems to be a substantial subpopulation of “hard-core” smokers who are unable to quit and stay quit (Augustson & Marcus, 2004; Hughes, 1996; Warner & Burns, 2003).

Early Smoking Lapse

We believe that one such hard-core subpopulation comprises smokers who have a quit-attempt history characterized primarily by early lapses to smoking following quit attempts. We refer to this group as *early-lapse smokers*. Research suggests that, despite advances in smoking-cessation treatments and smokers' sincere desire to quit, approximately 50% of treatment-seeking smokers will lapse within the first week or two after initial cessation (Brown et al., 1998; Cook, Gerkovich, O'Connell, & Potocky, 1995; Doherty, Kinnunen, Militello, & Garvey, 1995; Garvey, Bliss, Hitchchock, Heinold, & Rosner, 1992; Shiffman et al., 1997). Further, early lapse to smoking after a quit attempt seems to be a significant risk factor for subsequent relapse. In ancillary analyses of a treatment outcome study by Brown et al. (2001a), 37% of the 171 participant smokers lapsed on the planned quit date. Moreover, 100 (58.5%) participants smoked within the first week after quit date. Only 10% of these 100 participants were abstinent at the 6-month follow-up, compared with 47.9% of those who abstained completely during the first week of quitting. At the 1-year follow-up, the comparable abstinence rates were 18% for the first week lapsers versus 45.1% for the first-week abstainers. Other researchers have found similar results (Cook et al., 1995; Doherty et al., 1995; Garvey et al., 1992; Shiffman et al., 1997). Thus, convergent evidence indicates that early lapses to smoking are both frequent and highly predictive of subsequent (full-blown) relapse, and individuals with a history of early lapse are at particular risk for persistent smoking and the associated long-term health consequences.

Early smoking lapse following a cessation attempt may be motivated by the desire to avoid the distressing, interoceptive sensations associated with nicotine withdrawal. As nicotine reaches the brain within 6 to 8 seconds upon cigarette inhalation (USDHHS, 1988), the result is almost immediate, negative reinforcement in the form of relief of the (previously) experienced distress of nicotine withdrawal. Baker, Piper, McCarthy, Majeski, and Fiore (2004) described a model emphasizing the role of negative reinforcement in substance-use disorders, particularly in relation to negative affect in withdrawal syndromes. Several lines of research examining the phenomenon of early lapse among smokers lend support to Baker et al.'s theoretical predictions. That is, researchers have found that individual differences in withdrawal severity and negative affect significantly predict early lapse (al'Absi, Hatsukami, Davis, & Wittmers, 2004; Brandon et al., 2003; Kenford et al., 2002; McCarthy, Piasecki, Fiore, & Baker, 2006; Strasser et al., 2005). For example, using methods to track moment-to-moment changes in smokers' experiences throughout the early course of quit attempts, Piasecki et al. (2003) found that lapsers' subjective reports of withdrawal were more severe and volatile compared with reports from abstainers. In addition, using similar methods, Shiffman and Waters (2004) found that rapid increases in negative affect immediately preceded relapse to smoking.

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Distress Tolerance

Theory and Research

Taken together, recent investigations highlight the central role of negative affect and nicotine withdrawal in smoking lapse and subsequent relapse. However, another line of research suggests that it is not solely the severity or intensity of distress that predicts smoking lapses but also the degree to which an individual is able to tolerate discomfort and distress in general (Brown, Lejuez, Kahler, & Strong, 2002). In an initial laboratory study designed to examine the relationship between reactions to distress and smoking outcomes, we recruited current smokers who were distinguished by their reported histories of either immediate (had never quit for more than 24 hr) or delayed relapse (had quit for at least 3 months in the past; Brown et al., 2002). We assessed smokers' distress tolerance as indexed by their persistence on several psychological and physical challenge tasks that were designed as analogues for the physical and psychological stresses experienced during early withdrawal. The physical challenge tasks consisted of inhalations of carbon dioxide (CO_2) enriched air (for details, see Lejuez, Forsyth, & Eifert, 1998) and of a timed, breath-holding procedure (Hajek, Belcher, & Stapleton, 1987). The psychological challenge consisted of the modified Paced Auditory Serial Addition Task (PASAT; Diehr, Heaton, Miller, & Grant, 1998), a mental arithmetic challenge task requiring sustained attention despite aversive auditory feedback for incorrect responses that has been shown to produce elevated levels of stress (Holdwick & Wingenfeld, 1999). Participants were instructed to continue the tasks for as long as they liked but not to continue past the point at which they became uncomfortable. As an index of distress tolerance, we examined differences in whether individuals terminated each challenge task prior to its scheduled end point. The results indicated that immediate relapsers were more likely to terminate the CO_2, adjusted odds ratio (AOR) = 12.2, and PASAT challenges, AOR = 4.6, and had a shorter duration of breath holding than did delayed relapsers. This supported hypotheses that how one reacts to discomfort may be an important determinant of early lapse and relapse.

In a follow-up to this study (Brown, 2004), smokers who were initiating an unaided quit attempt were recruited to complete distress-tolerance tasks and were followed prospectively for 28 days following their designated quit date. Data indicated that persistence on the two physical stressors (breath holding and CO_2 persistence), but not the psychological stressor (PASAT) was significantly associated with reduced risk of lapsing. Those with low persistence on the physical stressors had a risk of lapsing during follow-up that was 3.27 times higher than for those with high persistence, $p = .006$. Brandon and colleagues (Brandon et al., 2003; Quinn, Brandon, & Copeland, 1996) have found similar results examining smoking relapse and *task persistence*, which describes the behavioral aspect of distress tolerance and derives from *learned industriousness theory* (Eisenberger, 1992). Task persistence has differentiated between smokers and nonsmokers (Quinn et al., 1996), and smokers' performance on a pretreatment measure of mirror-tracing persistence task prospectively predicted abstinence from smoking at 12-month follow-up (Brandon et al., 2003). Research examining the concept of anxiety sensitivity in relation to smoking has also produced findings relating this affective reaction to smoking outcomes (Brown et al., 2001b; Zvolensky et al., 2004). Thus, converging lines of research suggest that individuals' responses to discomfort and negative affect are important predictors of smoking outcomes and, in particular, early lapse to smoking.

Recently we presented a theoretical perspective on distress tolerance that highlighted the role of avoidant reactions to the discomfort of nicotine withdrawal and smoking cessation and suggested a role for new behavior therapies for smoking cessation (Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005). Consistent with the negative reinforcement model of Baker et al. (2004), avoidance strategies are thought to increase the stimuli (i.e., withdrawal, negative affect, craving) that they are intended to reduce and to reinforce the relationship between these internal stimuli and smoking (Gifford et al., 2004). The impact of avoidance strategies on self-

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administration of nicotine has been illustrated in a laboratory study examining attempts to avoid urges for alcohol in the context of strong environmental cues for both alcohol and smoking behavior. In a study by Palfai, Colby, Monti, and Rohsenow (1997), 50 daily smokers who were social drinkers were exposed to their favorite alcoholic drink and then told either to monitor or to suppress urges for alcohol. Following this procedure, participants were asked to refrain from drinking the alcohol, but they were permitted to smoke while smoking behaviors were assessed. Results indicated that although self-reported alcohol- and smoking-urge ratings were not influenced by the instructions to monitor versus suppress, more intense smoking behavior (i.e., more cigarette puffs) was observed among those who were instructed to suppress, rather than merely monitor, urges. In other words, an attempt to suppress urges to drink alcohol was related to a potentially compensatory increase in associated smoking behavior. Thus, suppression or avoidance of urges may be ineffective, and in fact such attempts may be associated with increases, rather than decreases, in smoking. In this way, avoidance strategies can be counterproductive by reinforcing the belief that having certain negative thoughts and feelings must necessarily result in smoking (e.g., “I have to get rid of this thought in order not to smoke, because this is why I smoke”). Further, avoidance efforts may redirect focus away from attempts to search for more effective behaviors.

Implications for a Distress-Tolerance Treatment

Given that early-lapse smokers can be characterized by low distress tolerance and low persistence, these smokers may benefit from treatments that target responses to withdrawal and negative affect in addition to standard treatments that are designed to ameliorate the internal physiological state of withdrawal discomfort (e.g., nicotine replacement therapy). The distress-tolerance treatment described in this article focuses on skills that facilitate tolerance of the experiences of nicotine withdrawal, negative affect, and other thoughts and feelings associated with quitting smoking, based on the premise that teaching smokers to minimize efforts to avoid or escape these aversive internal states will strengthen their ability to persist in attempts at smoking cessation.

In sum, a history of early lapse to smoking represents a significant risk factor for future relapse. Recent negative reinforcement conceptualizations of substance use suggest that individuals' reactions to withdrawal, rather than withdrawal severity itself, may represent an important treatment target in future interventions that are developed for this subpopulation of smokers. Early lapse smokers may particularly benefit from treatments that minimize avoidance behaviors and enhance skills needed to persist through the experiences of nicotine withdrawal and negative affect. In this article, we describe the development of a novel distress tolerance treatment for early-lapse smokers.

To develop and examine our treatment, we selected a population hypothesized to have difficulty tolerating discomfort associated with withdrawal symptoms and negative affect. We selected a sample of early lapsers, defined as regular smokers with a history of at least one serious quit attempt in the past 10 years, with none lasting longer than 72 hr. Below, we describe a novel distress-tolerance treatment for early-lapse smokers that utilizes behavioral exposure to nicotine withdrawal and training in skills based in Acceptance and Commitment Therapy (ACT). Further, we present the results of a preliminary pilot study (n = 16) that represents the treatment-development phase of a two-phase project; the second phase, a randomized, controlled outcome trial, is still ongoing. Finally, clinical implications of this distress-tolerance treatment approach for early-lapse smokers are discussed.

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Distress-Tolerance Treatment

Program Overview

The treatment development phase of this project included three treatment cohorts with a total of 16 participants. The treatment comprised six 50-min individual sessions, nine 2-hr group sessions, and 8 weeks of transdermal nicotine patch (see Table 1). After the completion of each cohort, further adaptations were made in response to participant and therapist feedback. We designed the new, multicomponent distress-tolerance treatment around an established standard smoking-cessation treatment, both behavioral and pharmacological. We discuss these components first. We then describe the distress-tolerance treatment elements that draw from exposure-based and acceptance-based (ACT; Hayes, Strosahl, & Wilon, 1999) treatment approaches. Generally, the treatment program was designed to address three factors that maintain cigarette smoking, which were explained as the following: learned habit, nicotine dependence, and distress tolerance. To decrease potential participant reactance to the notion of tolerating distress, we framed the latter issue as one of "smoking to maintain a certain level of comfort," suggesting that participants could learn to manage discomfort in a different way so as to free them from using cigarette smoking as a means of maintaining a certain level of comfort.

Standard smoking cessation—Cognitive social learning theory (Bandura, 1997) provides a useful framework for conceptualizing smoking-cessation interventions. The social learning model views smoking as a learned behavior acquired through classical and operant conditioning and through cognitive processes, including modeling, self-control mechanisms, self-efficacy, and outcome expectancies (Brown & Emmons, 1991). Behavioral smoking-cessation interventions derived from the social learning model have traditionally been the most efficacious (Fiore, Bailey, & Cohen, 2000; Lichtenstein & Brown, 1982). These behavioral treatments include three interrelated phases: preparation, quitting, and maintenance ofcessation/prevention of relapse. A complete description of these components has been published previously (Brown, 2003). They are based on a standard behavioral protocol that has yielded positive outcomes in controlled trials including high-risk populations of smokers with past major depressive disorder (Brown et al., 2001a). In brief, the standard smoking components in our protocol included self-monitoring, identifying triggers, developing self-management strategies for coping with external triggers (e.g., avoid, alter, use a substitute), and relapse-prevention skills (e.g., identifying and planning for high-risk situations).

Pharmacotherapy and nicotine fading—In this treatment program, nicotine dependence was addressed through two principal interventions: pharmacotherapy and nicotine fading. The U.S. Public Health Service (Fiore et al., 2000) clinical practice guidelines for tobacco cessation recommend that pharmacotherapy be included as a treatment suggestion for all smokers who are planning to quit smoking in the next 30 days. Because we conceptualized early smoking lapse in the context of reactivity to experienced discomfort from symptoms of nicotine withdrawal, it is logical that a pharmacological approach that may ameliorate some of the effects of nicotine withdrawal be considered as part of treatment. The most widely used forms of pharmacotherapy for smoking cessation include four forms of nicotine replacement therapy (NRT; gum, transdermal patch, nasal spray, and inhaler) and one antidepressant (bupropion sustained release [SR]). All five of these pharmacological agents have been recommended as first-line agents in the treatment of nicotine dependence (Fiore et al., 2000). Evidence for the efficacy of these pharmacotherapies (Fiore et al., 2000) and a discussion of their relative merits and clinical usage (Goldstein, 2003) can be found elsewhere. In our treatment protocol, participants were provided with 8 weeks of transdermal nicotine patch.

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Nicotine fading involved gradually reducing the number of daily cigarettes smoked prior to quit date (Foxx & Brown, 1979). This process may serve to reduce smokers' dependence on nicotine gradually as they reduce their consumption. However, we expected that the experience of nicotine withdrawal symptoms throughout the fading process would also serve as the type of exposure to uncomfortable symptoms and sensations that we recommend for early lapsers and discuss below. Interventions involving scheduled reductions in cigarettes smoked have been effective both as stand-alone treatments (Cinciripini et al., 1995; Cinciripini, Wetter, & McClure, 1997) and as part of multicomponent interventions (Brown et al., 2001a).

Exposure procedures—A behavioral smoking-cessation intervention that addresses the issue of distress tolerance has at its core the systematic and repeated exposure to increasingly lengthy periods of smoking abstinence. We accomplished this by prescribing specific periods of smoking abstinence prior to quit date. These prescribed periods of abstinence were of increasing duration over time and were scheduled, whenever possible, to coincide with periods when specific trigger situations would otherwise occur. The schedule of gradually increasing duration had the intent of “building in” success and thus, presumably, increasing self-efficacy. Consistent with research findings from the anxiety literature (Craske, Street, & Barlow, 1989; Grayson, Foa, & Steketee, 1982), smokers must fully engage in this exposure experience without attempts to use distraction procedures or to engage in *control strategies* that promote experiential avoidance. Thus, in the case of exposure to abstinence-induced nicotine withdrawal, we proposed that prospective quitters needed to demonstrate a willingness to remain in this uncomfortable state with an acceptance of the discomfort and distress involved as they worked toward their desired goal of quitting smoking. To this end, ACT (Hayes et al., 1999) strategies were incorporated into the treatment.

Acceptance and Commitment Therapy—A recent innovation in behavior therapy is the development of theoretical and clinical approaches to experiential acceptance (Jacobson, 1997). Hayes et al. (1999) explained that acceptance involves actively engaging in the process of experiencing feelings, thoughts, memories, and so on, without attempting to avoid or change the experiences. Acceptance can also be defined as the behavior of approaching psychologically aversive or troubling internal stimuli while behaving adaptively (Gifford, 1994; Gifford & Hayes, 1997). Acceptance approaches seem well-suited to provide early-lapse smokers with the skills needed to persist in their exposure to nicotine withdrawal while remaining fully engaged in and nonavoidant of their reactions to nicotine withdrawal and quitting smoking. Smokers learn that controlling negative affect and avoiding thinking certain thoughts may simply not be a feasible permanent solution. Treatment components from ACT that have been developed to target effective responding to negative affect include acceptance, defusion, values clarification, commitment, self-as-context, and willingness (Hayes et al., 1999).

Acceptance and Commitment Therapy is an acceptance-based behavior therapy with accumulating support for a variety of clinical problems (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Pilot studies examining the efficacy of ACT for smoking cessation show preliminary support for the use of acceptance-based treatment components in this population. In one study, 76 nicotine-dependent smokers were randomly assigned to receive ACT or NRT (Gifford, 2004). Participants in the ACT condition showed better long-term outcomes, with 35% quit at 1 year versus 15% in the NRT condition. In a larger, randomized, controlled trial of 306 smokers, participants received ACT plus bupropion SR or bupropion SR alone (Gifford, Antonuccio, Kohlenberg, Hayes, & Piasecki, 2002). In this study, the researchers found that participants in the ACT plus bupropion SR condition had significantly higher quit rates than those who were assigned to bupropion SR alone, with 22% quit in the ACT-plus-bupropion-SR condition at 1-year follow-up compared with 9% quit in the medication-alone condition. These pilot trials lacked behavioral treatment control conditions, and therefore it is difficult to

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conclude whether outcomes were due? to the presence of a behavioral treatment or to ACT specifically. However, the findings show promise that acceptance-based treatments can be useful in smoking cessation, and the distress-tolerance treatment protocol described here was adapted from these earlier protocols.

Program Details

In this discussion of program details of the distress-tolerance treatment, we will describe the implementation of particular treatment components and discuss modifications that were made in response to participant and therapist feedback.

Treatment population—In our initial recruitment plan, we attempted to recruit a sample of those who had never quit smoking for longer than 72 hr in their lifetime. However, we encountered a substantial number of potential participants who reported quit attempts that were longer than 72 hr when they first started smoking but had not been able to stay quit in the recent past. In addition, there were cases in which women reported staying quit throughout pregnancy 20 or 30 years prior, but had not been able to remain abstinent for longer than 3 days since that time. Thus, for the purpose of maximizing recruitment, and because we believed that these individuals were relevant to the population of early-lapse smokers in spite of their early successes with quitting, we modified the criteria for inclusion. Instead of requiring fewer than 72 hr of abstinence in their lifetime, we recruited regular smokers with a history of at least one serious quit attempt who had not been able to quit smoking for longer than 72 hr in the past 10 years.

Structural elements—The structure of the distress-tolerance treatment included ten 90-min group sessions and six 50-min individual sessions delivered concurrently over an 8-week period. As our experience with this population of smokers suggested that they tend to be avoidant and potentially difficult to engage in cessation treatment, we hypothesized that establishing the therapeutic relationship prior to initiating group meetings would help to foster motivation and commitment to the program and, ultimately, to quitting smoking. Thus we scheduled their first two individual sessions with one of the two group therapists prior to the first group session. Indeed, therapist feedback indicated that this structure was useful to help forge a relationship with the participant, and it did seem to enhance treatment engagement. Individual sessions ended the week after quit week, and group sessions continued until 4 weeks post–quit day. The group sessions were designed to introduce information and concepts, whereas the individual sessions were intended to tailor new information and practice relevant exposure and experiential exercises. All sessions began with a review of previous material followed by the introduction of new concepts or exercises. Treatment also included weekly homework exercises and handouts that were reviewed at the beginning of each session. Quit day was scheduled for the sixth week of treatment to provide adequate time for skill acquisition and nicotine fading.

Treatment rationale—Providing a coherent rationale for the overall treatment and for individual treatment components was an important aspect of the intervention. Providing an adequate rationale can affect both the credibility and expectancy of treatment (Horvath, 1990; Kazdin & Krouse, 1983), which in turn have been found to predict psychotherapy outcomes (Borkovec & Costello, 1993; Chambless, Tran, & Glass, 1997; Collins & Hyer, 1986). In our treatment, therapists explained that there are three factors that maintain smoking behavior. That is, smoking is a

1. Learned habit: A habit is a behavior pattern that is overlearned through years of repetition.

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2. Physical addiction: In cigarettes, the addictive substance is the drug nicotine. Your body becomes dependent on nicotine so that when you try to quit, withdrawal symptoms occur. Common withdrawal symptoms include depression, insomnia, irritability, anxiety, difficulty concentrating, restlessness, and increased appetite/ weight gain. Typically, withdrawal symptoms may last 1 to 2 weeks.
3. Way to maintain a certain comfort level: People often smoke either to increase their comfort level when they are feeling bad (e.g., sad, nervous or stressed) or to maintain their comfort level when they are feeling good (e.g., happy or relaxed).

Therapists explained that an effective treatment must address all three factors, and that this treatment is intended to

> (1) help you understand the learned habit aspect of your smoking so you can anticipate and develop nonsmoking habits in former smoking situations; (2) gradually reduce your physical addiction (dependence) on nicotine through a procedure called nicotine fading and use of the nicotine patch; and (3) manage discomfort in a different way so that you won't use cigarette smoking in order to maintain a comfort level. By addressing these factors, this treatment program helps with initial quitting, as well as the prevention of relapse.

Weeks 1 and 2—As previously mentioned, the first 2 weeks of treatment included two 50-min individual sessions. The primary goals of these sessions were to engage participants in treatment and to enhance their motivation and commitment. These goals were designed to be accomplished through a discussion of life values as they relate to quitting smoking and through assessment of the phenomenology of smoking and past quit attempts. The values assessment served two major functions. First, values clarification served to increase motivation through fostering the therapeutic relationship and creating an agreed-on therapeutic contract. It has been suggested that values and vulnerability are at the core of intimacy and a strong therapeutic alliance (Wilson & Murrell, 2004). Using the Valued Living Questionnaire (Wilson & Groom, 2002) as a guide, therapists helped participants to identify their values and to describe how quitting smoking fits into having a more meaningful life. Second, values assessment was used as a tool to define specific behaviors that participants could engage in during the quit process and to strengthen the salience of reinforcers associated with values. It was hypothesized that the negatively reinforcing qualities of smoking were particularly strong with this population. Therefore, increasing access to positive reinforcers was an important treatment target in increasing motivation. Many smoking programs encourage engagement in alternative behaviors to decrease exposure to trigger situations and to distract from urges to smoke. The alternative behaviors we identified in this program were associated with valued life domains with the idea that these targets would be intrinsically positively reinforcing and as such would increase the likelihood that participants would engage in the behaviors.

Assessment of the phenomenology of smoking and quit attempts was conducted through self-monitoring and in-depth functional assessment interviews. During the first 2 weeks of treatment, participants were instructed not to change their smoking behavior but to monitor their smoking on self-monitoring records. As part of the functional assessment of smoking history, therapists reviewed these records during the second individual session and asked participants to identify internal (e.g., physiological sensations, feelings, thoughts) and external (e.g., coffee, driving, other smokers) experiences associated with smoking. Similarly, therapists conducted functional assessments of participants' previous quit attempts. Participants were asked to continue monitoring through quit day.

Weeks 3 through 5—During weeks 3 through 5, the overarching treatment goals included nicotine fading, identification of external and internal triggers, and practice of new responses

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to triggers (e.g., self-management skills, acceptance, defusion). These treatment goals were accomplished through didactic and experiential exercises during group and individual sessions. During these sessions, therapists continued to facilitate group cohesion and the therapeutic relationship to bolster motivation and commitment. Of note, as quit day approached, participants reported increased anticipatory anxiety, which seemed to distract some participants during group discussions. Therefore, as we proceeded in treatment development, we added centering and meditation exercises to the beginning of group sessions to practice focusing on the present moment and to increase awareness.

Nicotine fading—During the first group session, participants were instructed to decrease the number of cigarettes smoked in 20% decrements during the 3 weeks prior to quit date. One drawback of nicotine fading is that smokers may compensate by changing the topography of their smoking behavior (e.g., inhaling more deeply, smoking more of each cigarette, blocking filter holes). Smokers were cautioned about this possibility and advised to keep such changes to a minimum. Anecdotally, participants reported that nicotine fading was more difficult and distressing than quit day itself. Thus, as anticipated, nicotine fading seemed to decrease actual nicotine intake and increase discomfort, providing opportunities for exposure to aversive internal stimuli.

Psychoeducation about triggers—Therapists led didactic sessions in which they explained that smoking involves two main categories of triggers: external and internal. Careful attention was given to the distinction between external versus internal triggers, as different strategies were emphasized for each. External triggers include persons, places, situations, or things that exist outside the smokers but are associated with smoking and urges to smoke; for example, some common external triggers include coffee, after meals, other smokers, alcohol, and certain rooms in the house. Internal triggers include experiences that occur within the smoker, such as physical sensations, thoughts, feelings, and memories. Some common internal triggers include irritability, stress, anxiety, and sadness.

Self-management skills—Traditionally, cognitive-behavioral strategies used in smoking-cessation programs have targeted changing or controlling triggers. Self-management techniques aimed at avoiding, altering, or substituting triggers are frequently effective in helping smokers to cope with external triggers; for example, throwing away all cigarettes in the house, changing one's route to work, and chewing cinnamon sticks. Participants were encouraged to practice these skills during the week. At the beginning of each group, there would be a discussion of these strategies, including problem solving around difficult situations. Importantly, therapists emphasized the use of self-management techniques in response to external triggers. As is discussed below, other strategies were to be used with internal triggers, and this was explained to participants.

Exposure—Exposure procedures comprised scheduled abstinence and experiential exercises, which were conducted during group and individual sessions. The prescribed periods of smoking abstinence were scheduled to take place immediately prior to individual and/or group treatment sessions in which discussions focused on the practicing new skills in response to internal triggers (e.g., withdrawal symptoms, negative affect, etc.). Scheduled abstinence periods were described as “practice quitting” times that could be opportunities to use new skills before the actual quit date and involved increasing lengths of time ranging from 1 to 4 hr. Experiential exercises, including cue exposure, were also included in the treatment protocol. Cue exposure has been used in other substance-using populations and typically involves presenting substance-associated stimuli without the opportunity to engage in the substance using behaviors (Childress et al., 1993; Drummond, Cooper, & Glautier, 1990). In our protocol,

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stimuli that were used to elicit cravings included cigarette packs, lighters, and imaginal exposure exercises.

Acceptance—As part of the introduction to acceptance, therapists illustrated how efforts to control or avoid internal experience may actually lead to smoking and to problems with quitting. Therapists explained that instead of self-management strategies, acceptance should be used in response to internal triggers. The following is an example of how the idea of acceptance was introduced:

> The ways to cope with external triggers and internal triggers are different. With external triggers, the goal is to avoid, alter, or find some substitute for triggers. This approach works really well for the world "outside the skin," but does not work as well for the world "inside of the skin." Ask someone to allow you to use his/her pack of cigarettes. Ask group members what cravings/thoughts/feelings they experience with the cigarettes in front of them. Write down some of the examples. One way to avoid external triggers is to throw a pack of cigarettes into a trashcan (illustrate). Where are the cigarettes now? They are no longer in front of you. You've effectively gotten rid of the trigger. Now let's try this with one of your internal triggers (Use examples that were written down on paper). We'll throw this internal trigger (specify) into the trashcan (crumple paper and throw it into the trash can). Now, check to see if you've gotten rid of that thought/feeling. Probably not. So we need a different set of strategies to deal with internal triggers.

Acceptance and exposure exercises were interrelated in that they evoked uncomfortable responses, but rather than having the goal of habituation of feelings, the goal was acceptance of those feelings. Through exercises and metaphors, therapists illustrated that there is not an intrinsic link between feelings and actions and that the presence of aversive internal experiences, in and of themselves, do not constitute a threat. That is, having a particular feeling (e.g., irritability, sadness, etc.) does not necessarily cause the behavior of smoking. Individuals were guided through exposure exercises eliciting difficult feelings, thoughts, or urges in the service of practicing new, effective behaviors that were more consistent with their values. Participants learned to experience the actual consequences of feeling and thinking and learned to respond to those consequences instead of verbally constructed (i.e., imagined) consequences (e.g., "I'm going to lose it"). For example, an acceptance exercise might include nonjudgmentally describing what happens (physical sensations, thoughts, feelings, memories) as they are holding a pack of cigarettes and not smoking.

During the course of treatment development, therapists noted that participants had difficulty understanding certain aspects of acceptance. We modified the explanation of acceptance to clarify several points of confusion. First, therapists clarified the distinction between acceptance and resignation. Some participants believed that the message of acceptance was to "just deal with it." We addressed this misunderstanding by having therapists emphasize the active process of acceptance versus the passive process of resignation. For example, acceptance of the difficult sensations related to quitting smoking is described as an active process that includes changing how one behaves in response to these experiences. In contrast, resignation is described as a passive process that involves focusing exclusively on the difficult feelings and their aversive nature and is, by definition, not the active process of acceptance and attendant constructive action.

A second point of clarification regarding acceptance was that acceptance, in and of itself, is not the main goal of treatment or life. Rather, the main goal is to live a values-consistent life in which they are not smoking. Acceptance skills can be used to help facilitate that goal. Hayes et al. (2006) also discuss this point of clarification. Finally, we included additional material clarifying that using acceptance to control feelings is not true acceptance. In fact, using

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acceptance to control feelings does not seem to work. Some participants expressed frustration when aversive feelings did not decrease after using acceptance skills. Therapist and participant feedback suggested that clarifying these points of confusion through additional exercises and explanations helped participants use these skills more effectively over time.

Defusion—Another skill that was taught in this treatment emphasized effective response to triggering thoughts. Defusion is the process of disrupting the ordinary meaning functions of language such that the believability of thoughts is undermined. For example, if an individual states “I am depressed,” defusion exercises would target having the person change how they relate to that thought from a description of personal identity to a description of a process (i.e, “I am a person who is having a feeling called depression at this moment”). Similar to exposure and acceptance, defusion functions to facilitate new associations to cognitive triggers. Participants engaged in exercises designed to identify cognitive triggers and to create psychological distance between thought and behavior, disrupting belief that they are causally connected.

Many techniques can be used for the purpose of defusion (see Hayes et al., 1999). For example, the simple exercise of having participants label their thoughts as such (i.e., “I am having the thought that I need a cigarette right now”) recontextualizes so that it is just a thought rather than a cause with a necessary effect. Another example is Titchener's (1916) famous “milk, milk, milk” exercise. The word “milk” elicits a range of associations (e.g., white, cold, creamy, glass, cow, etc), as does the word “cigarette” (e.g., calm, relaxed, smoke). If you repeat either of these words in rapid succession, it soon becomes a different sound, dissociated from the previously mentioned associations. Another exercise that seemed to work well with this population was called “take your mind for a walk.” This exercise is described in detail in Hayes et al. (1999). Briefly, participants practice defusion by creating physical distance between thoughts and action. Participants are paired, with one person playing the role of the smoker and the other person playing the role of the smoker's mind. Anecdotally, this exercise served as practice of defusion from thoughts, but it also introduced a transition period, which was described as a difficult trigger by many participants. Thus, the exercise also created an opportunity to practice defusion and acceptance skills related to thoughts/feelings introduced by the transition period.

Week 6: quit week—Quit day was on a day in which a group meeting was scheduled to provide participants with additional reinforcement and support on their first day. Given that this treatment population had not been able to stay quit for longer than 72 hr in the past 10 years, we believed it would be beneficial to meet with them during this early phase of quitting. Participants were provided with the 21 mg transdermal nicotine patch for 4 weeks to start and then were tapered down to 14 mg for 2 weeks and 7 mg for 2 weeks. Therapists instructed participants to put the nicotine patch on the morning of quit day. Over time, we included additional instructions about the nicotine patch. A number of participants smoked cigarettes before putting the patch on, rationalizing that quit day actually began after they put on the patch. Also, some participants put the patch on the night before quit day, which became an issue for some individuals who experienced sleep disturbance as a side effect of the patch. In some cases in which this occurred, individuals reported that the lack of sleep made it difficult to get through the first day of being quit. Therefore, we stressed the importance of quit day and stated that it begins at midnight of that day. We also encouraged participants to put the patch on the morning of quit day rather than the preceding night.

Relapse prevention—Therapists provided psychoeducation regarding the phenomenon of relapse, high-risk situations, and relapse-prevention strategies. Initially, we included a discussion of Marlatt and Gordon's (1985) abstinence violation effect (AVE) in which we would predict that relapse might occur. In those situations, feeling guilty, sad, and disappointed

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could lead to full-blown relapse, so they should be forgiving of themselves and view it as a slip. Interestingly, therapist and participant feedback suggested that participants used this discussion of AVE as an excuse for slipping. That is, some participants rationalized that the therapists expected them to slip, so it was acceptable to do so. Therefore, we deleted a formal discussion of AVE. Instead, in instances in which participants experienced a slip, therapists encouraged participants to view the slip as a mistake, identified the chain of events leading to the slip, problem solved new coping strategies, and encouraged commitment to quit again as soon as possible. That is, AVE content was discussed, but only in response to a slip that had already occurred, and the AVE label was no longer used.

Another modification that was made to the treatment manual was adding a discussion of how group members could be supportive of each other in instances of slips. Therapists noticed that group members tended to let each other “off the hook” or change the subject to escape the discomfort associated with discussing slips. Therefore, we added a brief opening statement to all groups after quit day about how to support each other in discussing these uncomfortable situations and in sharing strategies for dealing effectively with high-risk situations.

Self-as-context—Hayes et al. (2006) explained, “self as context is important in part because from this standpoint one can be aware of one's own flow of experiences without attachment to them or an investment in which experiences occur” (p. 9). The current treatment emphasized this skill of shifting one's perspective of self relative to his or her experiences. Therapists explained how shifting one's perspective of self from that of the content of their experiences (e.g., thoughts, cravings, etc.) to the context of their experiences can be useful. For example, rationalizing that “only smokers have cravings,” some participants reported feeling “stuck” trying to decide whether they are a “smoker” or a “nonsmoker” because they continued to have cravings. Experiential exercises were conducted to facilitate the process of having participants see themselves as the context in which they experience multiple events (e.g., cravings, thoughts, feelings, etc.) rather than the events themselves. Several different exercises can be used for this purpose (Hayes et al, 1999). One example of an exercise we used in our treatment program is the chessboard metaphor, in which participants are invited to notice “good” and “bad” experiences as the white and black chess pieces on a chessboard and to adopt the perspective of the chessboard (rather than getting caught up in the good-bad, black-white struggle of the thoughts, feelings, cravings, etc.).

Weeks 7 through 10—The last 3 weeks of treatment included group sessions only. These sessions were intended to provide social support, review concepts, reinforce commitment to effective changes, and plan for relapse prevention. During this time, we also focused on generalizing skills beyond smoking situations to other life domains, for example, applying acceptance skills to negative affect experiences unrelated to nicotine withdrawal.

Values and committed action—In the remaining weeks of treatment, therapists reviewed values clarification. Sessions involved a discussion of values-related goals and barriers, with an emphasis on maintaining abstinence and committed action. Therapists discussed committed action as a process and used the example of being married or being a parent—each day recommitting. During group sessions, therapists encouraged participants to make a verbal commitment to continue the process of quitting and living values-consistent lives.

The goal of these sessions was to continue to highlight alternative positive reinforcers that provided realistic behavioral alternatives to the negatively reinforced avoidant behavior of smoking. Anecdotally, upon quitting smoking, several participants questioned, “now what do I do?” Valued activities provided guidance in response to this question, and participants were encouraged to engage in valued activities during the week. Participants were asked to complete homework assignments and invited to participate in experiential exercises designed to facilitate

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values clarification (Hayes et al., 1999; Wilson & Murrell, 2004). For example, originally, we used eulogy exercise as outlined in the ACT book (Hayes et al., 1999); however, participants noted that they felt they were receiving the message that if they smoke they will die, which elicited anger and anxiety that distracted from the intent of the exercise of identifying values. Thus, the exercise was modified to describe participants' 85th birthday party, which functioned to help identify values while being more palatable.

Assertiveness skills—Interpersonal problems can be a significant factor related to relapse to smoking (McKay, 1999), and social-skills training has been a component of an efficacious smoking-cessation treatment for smokers with a history of recurrent depression (Brown et al., 2001a). In addition, participants frequently reported that their most important values were associated with relationships to others. Thus, we believed that assertiveness-skills training would be an important component to include in this treatment for early-lapse smokers. Therapists asked participants to discuss social supports for nonsmoking, helped to develop strategies for maximizing social support systems, and developed participants' skills in requesting behavioral changes from others.

Willingness—Willingness, like acceptance, is nonjudgmental contact with psychological events as they occur without putting limits on the extent to which one allows oneself to experience those events (Hayes et al., 1999). This treatment component addressed smokers' inclination to make deals or bargains with themselves that they would be willing to endure discomfort only to a certain point, at which time they would smoke. After quit day, some individuals identified that they would stay quit, unless they continued to feel craving for longer than 1 month. Others indicated that they would stay quit unless an emotional event occurred (e.g., death of a loved one, job loss, etc.). Therapists explained

> (t)his bargaining starts to happen when we put limits on what we are willing to tolerate and what we are not willing to tolerate. Our minds can be very convincing, and so it's very easy to believe that these bargains are going to work. Unfortunately, the bargains rarely work out. When we put limits on what we are willing to tolerate, quitting is often even more difficult.

Therapists discussed participants' conditions for staying quit in the context of how they related to participants' values and goals. During group sessions and through homework exercises, participants identified barriers to willingness. Therapists asked participants to “bust themselves in advance” by identifying potential reasons they might use to return to smoking. Participants were invited to use acceptance and defusion skills in planning how to respond effectively to these future high-risk situations.

Preliminary Outcomes

This research describes preliminary findings from the treatment development phase for this novel distress-tolerance treatment for early-lapse smokers.

Measures

Self-reports of smoking status were collected from participants at the end of treatment and at 8-, 13-, and 26-week postquit follow-ups. Participant reports of abstinence at all times were verified by expired carbon monoxide. Hughes and colleagues (Hughes et al., 2003) recommend reporting multiple measures of abstinence, including sustained continuous abstinence (i.e. no lapses) to reflect the longest length of time smokers were able to abstain allowing for initial lapses; percentage of smokers who relapse (the seventh day of consecutive days of smoking any cigarettes) to reflect a return to a regular smoking pattern, and survival to lapse and relapse to index how long smokers persisted in their quit attempts. A smoking lapse has been defined

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as an episode of smoking that violates continuous abstinence, whereas a relapse is a resumption of regular smoking (Hughes et al., 2003; Shiffman, 2006). Self-report is always overridden by objective verification in the conservative direction (i.e., smoking). In addition to point-prevalence outcomes, we also used the timeline follow-back (TLFB) procedure for assessing the time to first smoking lapse and the time to first relapse, defined as the seventh day after quit date on which smoking occurs. The TLFB procedure has demonstrated good reliability and validity with adult alcoholics ("Sobell & Sobell, 1979, 1980, 1996) and we have validated the TLFB for the assessment of adult cigarette use (Brown et al., 1998). The TLFB was administered at follow-ups to assess cigarette use since the previous assessment.

Smoking history—Smoking history and pattern were assessed with the Smoking History Questionnaire (SHQ; Brown et al., 2002), which includes items pertaining to smoking rate, age of onset at initiation, and years of being a daily smoker.

Severity of dependence—The Fagerstrom Tolerance Questionnaire (FTQ) was used as a continuous measure of nicotine dependence (Fagerstrom, 1978). Specifically, we administered the FTQ and scored it as the Fagerstrom Test for Nicotine Dependence (FTND; see Heatherton, Koslowski, Frecker, & Fagerstrom, 1991, for scoring details). The FTND has shown good internal consistency, positive relations with key smoking variables (e.g., saliva cotinine; Heatherton et al., 1991; Payne, Smith, McCracken, McSherry, & Antony, 1994), and high degrees of test–retest reliability (Pomerleau, Carton, Lutzke, Flessland, & Pommerleau, 1994).

Depressive symptoms—The Center for Epidemiological Studies–Depression Scale (CES–D; Radloff, 1977) is a measure of depressive symptoms. Respondents indicate how often within the last week they experienced the symptom in question, responding: *rarely or none of the time*, *some or little of the time*, *occasionally or a moderate amount of the time*, and *most or all of the time*. The CES–D is a well-established measure of depressive symptoms (Corcoran & Fischer, 1987).

Participants

Participants (n = 16) were early lapse smokers, selected on the basis of having had no quit attempt (in the past 10 years) that was sustained from more than 72 hr. Our advertisement campaign specifically targeted smokers who have had "previous difficulty quitting for even short periods of time," yielding 427 callers who participated in a brief phone screen interview between June 2004 and May 2005. Of these, 388 callers were ruled out on phone screen with the majority of individuals not meeting criteria for early lapse (48.2%), whereas others were excluded due to psychotropic medication (16.8%), smoking fewer that 15 cigarettes/day (13.1%), being over age 65 (7.7%), and for other reasons (14.2%). Of the 39 callers who met study criteria according to the phone screen, 17 no-showed to baseline assessments, 6 were ruled out based on Structured Clinical Interview for *DSM-IV* (SCID) interview (met criteria for current Axis I disorder), and the remaining 16 met eligibility criteria and participated in the study.

All participants were between 18 and 65 years of age, had been a regular smoker for at least 3 years, and were currently smoking an average of at least 15 cigarettes per day. Exclusion criteria included current Axis I disorder, psychoactive substance abuse or dependence (excluding nicotine dependence) within the past 6 months, current use of psychotropic medication, a history of significant medical condition, and use of other tobacco products or current use of any pharmacotherapy for smoking cessation. The majority of participants were female (75%). Baseline demographic, smoking, and affect-related variables are outlined in Table 2.

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Smoking outcomes—Follow-up assessments were completed at 8-, 13-, and 26-weeks post–quit day, and completion rates for these assessments were 87.5%, 81%, and 75%, respectively. The verified, 7-day point prevalence abstinence rate at the end of treatment (4 weeks postquit) was 31.25%. At the 8-, 13-, and 26-week post quit date follow-up assessments, the 7-day point prevalence abstinence rates were 25.0%, 18.75%, and 0%, respectively. The median of participants' longest period of continuous abstinence at any time during the 26-week follow-up period was 24 days (M = 41.56, SD = 44.67). The median number of total days abstinent (non-continuous) during both treatment and follow-up was 40.5 (M = 58.75, SD = 56.06) out of 180 days. Among these participants, who had never been quit for longer than 72 hr in the past 10 years, the majority (n = 13, 81.2%) were able to remain quit for longer than 72 hr, 12 (75%) were able to stay quit for longer than 1 week, 11 (68.8%) for longer than 2 weeks, and 7 (43%) for longer than 1 month.

Although most participants lapsed almost immediately (Median = 5.0 days, M = 20.4 days, SD = 33.77), full-blown relapse did not occur until much later. As illustrated in Figure 1, the median time to relapse (7 consecutive days of smoking) was 45.5 days (M = 49.88, SD = 51.21). The average time from initial lapse to full-blown relapse was 18.8 days (SD = 15.80). Despite lapses, participants continued to make efforts to quit smoking, with smokers regaining a period of abstinence during the treatment and follow-up periods multiple times with the median being 2.5 quit attempts (M = 4.13, SD = 5.48).

Treatment acceptability—Treatment attendance and participant ratings were used as measures of treatment acceptability. Fourteen participants (87.5%) attended at least five of the six individual sessions, and eight participants (50%) attended at least seven group sessions. Despite most people lapsing before the end of treatment, 75% of participants attended the last group session. Further, of the 11 participants who completed a program evaluation questionnaire at the end of treatment, 82% indicated that the specific skills learned in this program were *very* or *extremely useful* in helping them quit smoking.

Discussion

In this article, we describe a novel, multicomponent distress-tolerance treatment incorporating behavioral and pharmacological elements of standard smoking-cessation treatment while drawing distress-tolerance elements from exposure-based and acceptance-based treatment approaches. The participants in the pilot study were characterized by an early-lapse history, meaning they had not been able to quit for longer than 72 hr in the past 10 years. To our knowledge, no other treatment studies have been conducted specifically targeting a population of early-lapse smokers. Because this is the first attempt to develop a treatment for this at-risk population of smokers, there is no basis for comparing these findings to outcomes in other studies. However, we can compare participants' outcomes to their past histories. In previous quit attempts over the preceding 10 years, participants reported that they had not been able to remain abstinent for longer than 3 days. Yet, in the current pilot study, participants achieved a median of 24 days of continuous abstinence and 40.5 days of noncontinuous abstinence. It is possible that participants would have performed similarly given other treatments; however, we believe that the current results are in part due to increases in distress tolerance. We are encouraged by these findings, as researchers have found that a greater number and greater duration of past quit attempts are predictive of maintenance of cessation at 6-month follow-up (Garvey et al., 1992; Ockene et al., 2000). Although all participants indicated that they were smoking at the 26-week postquit follow-up, the experience of having longer quit attempts during this time period might influence future quit attempts that were not captured in these assessments.

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Our findings seem to provide evidence of increased persistence at maintaining smoking abstinence. That is, participants who had not achieved sustained abstinence for more than a few days in the past 10 years showed greater latency between quitting, lapsing, and relapsing. Also, participants continued to persist at attending treatment sessions and attempting to sustain abstinence despite lapses to smoking. This demonstrated that persistence provides indirect support for the premise that this treatment may have increased distress tolerance in these smokers with a history of early smoking lapse and thereby lowered their relapse risk.

Other indirect support for increased distress tolerance in this treatment is evidenced by participants' unexpected persistence through treatment despite difficulties with quitting. Although few studies have examined this directly, treatment outcome findings suggest that many smokers who lapse during treatment drop out of treatment shortly thereafter (Borrelli et al., 2002; Patterson et al., 2003; Shiffman et al., 2006). Yet, the current findings suggest that these participants continued to stay in treatment despite smoking lapses. Further, participants persisted in attempting to quit throughout treatment and follow-up.

As anticipated, baseline levels of negative affect were high in this population. Although there was substantial variability in CES–D scores, the average score revealed mild-to-moderate depressive symptoms (Radloff, 1977). Although it is unclear how these characteristics interacted to influence outcomes, as the small sample size limited our capacity to examine this, our previous work suggests that smokers with a history of early lapse experience elevated levels of negative affect plus a limited ability to tolerate fluctuations in affective responses (Brown et al., 2004). We have previously referred to this combination as a “double whammy” with regard to early lapse in quitting smoking (Brown et al., 2002).

An important element of this study is that it brings empirical data to the study of distress-tolerance processes, an area of rich clinical relevance but lacking in current data. Thus by understanding the clinical import of distress tolerance, we may be able to refine theoretical models of smoking lapse and potentially inform the larger literature on distress tolerance processes. A small, randomized controlled trial is currently underway with early lapse smokers, comparing this novel distress tolerance treatment to a standard cognitive-behavioral smoking cessation program. We are looking forward to the results of this outcome trial and to examining mechanisms related to both the treatment and to this subpopulation of smokers. Overall, we are optimistic about this exciting new distress tolerance treatment and its promising preliminary findings.

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References

al'Absi M, Hatsukami D, Davis GL, Wittmers LE. Prospective examination of effects of smoking abstinence on cortisol and withdrawal symptoms as predictors of early smoking relapse. Drug and Alcohol Dependence 2004;73(3):267–278. [PubMed: 15036549]

Augustson E, Marcus S. Use of the current population survey to characterize subpopulations of continued smokers: A national perspective on the “hardcore” smoker phenomenon. Nicotine & Tobacco Research 2004;6(4):621–629. [PubMed: 15370158]

Baker TB, Piper ME, McCarthy DE, Majeskie MR, Fiore MC. Addiction motivation reformulated: An affective processing model of negative reinforcement. Psychological Review 2004;111(1):33–51. [PubMed: 14756584]

Bandura, A. Self-efficacy: The exercise of control. New York: Freeman; 1997.

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Borkovec TD, Costello E. Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. Journal of Consulting and Clinical Psychology 1993;61(4):611–619. [PubMed: 8370856]

Borrelli B, Hogan JW, Bock B, Pinto B, Roberts M, Marcus B. Predictors of quitting and dropout among women in a clinic-based smoking cessation program. Psychology of Addictive Behaviors 2002;16(1): 22–27. [PubMed: 11934082]

Brandon TH, Herzog TA, Juliano LM, Irvin JE, Lazev AB, Simmons VN. Pretreatment task persistence predicts smoking cessation outcome. Journal of Abnormal Psychology 2003;112(3):448–456. [PubMed: 12943023]

Brown, RA. Intensive behavioral treatment. In: Abrams, DB.; Niaura, R.; Brown, RA.; Emmons, KM.; Goldstein, MG.; Monti, PM., editors. The tobacco dependence treatment handbook: A guide to best practices. New York: Guilford Press; 2003. p. 118-177.

Brown RA, Burgess ES, Sales SD, Whiteley JA, Evans DM, Miller IW. Reliability and validity of a smoking timeline follow-back interview. Psychology of Addictive Behaviors 1998;12(2):101–112.

Brown, RA.; Emmons, KM. Behavioral treatment of cigarette dependence. In: Cocores, JA., editor. The clinical management of nicotine dependence. New York: Springer-Verlag; 1991. p. 97-118.

Brown RA, Kahler CW, Niaura R, Abrams DB, Sales SD, Ramsey SE, Goldstein MG, Burgess ES, Miller IW. Cognitive-behavioral treatment for depression in smoking cessation. Journal of Consulting and Clinical Psychology 2001a;69(3):471–480. [PubMed: 11495176]

Brown RA, Kahler CW, Zvolensky MJ, Lejuez CW, Ramsey SE. Anxiety sensitivity: Relationship to negative affect smoking and smoking cessation in smokers with past major depressive disorder. Addictive Behaviors 2001b;26(6):887–899. [PubMed: 11768550]

Brown RA, Lejuez CW, Kahler CW, Strong DR. Distress tolerance and duration of past smoking cessation attempts. Journal of Abnormal Psychology 2002;111(1):180–185. [PubMed: 11866171]

Brown RA, Lejuez CW, Kahler CW, Strong DR, Zvolensky MJ. Distress tolerance and early smoking lapse. Clinical Psychology Review 2005;25(6):713–733. [PubMed: 16023275]

Brown, RA.; Lejuez, CW.; Strong, DR.; Kahler, CW.; Niaura, R.; Carpenter, L., et al. Distress tolerance in response to physical and psychological stressors: Relationship to smoking cessation among self-quitters. Paper presented at the Society for Research on Nicotine and Tobacco; Scottsdale, AZ. 2004 Feb.

Chambless DL, Tran GQ, Glass CR. Predictors of response to cognitive-behavioral group therapy for social phobia. Journal of Anxiety Disorders 1997;11(3):221–240. [PubMed: 9220298]

Centers for Disease Control and Prevention. Targeting tobacco use: The nation's leading cause of death. Atlanta, GA: 2005.

Childress AR, Hole AV, Ehrman RN, Robbins SJ, McLellan AT, O'Brien CP. Cue reactivity and cue reactivity interventions in drug dependence. NIDA Research Monograph 1993;137:73–95. [PubMed: 8289929]

Cinciripini PM, Lapitsky L, Seay S, Wallfisch A, Kitchens K, Van Vunakis H. The effects of smoking schedules on cessation outcome: Can we improve on common methods of gradual and abrupt nicotine withdrawal? Journal of Consulting and Clinical Psychology 1995;63(3):388–399. [PubMed: 7608351]

Cinciripini PM, Wetter DW, McClure JB. Scheduled reduced smoking: Effects on smoking abstinence and potential mechanisms of action. Addictive Behaviors 1997;22(6):759–767. [PubMed: 9426793]

Collins J, Hyer L. Treatment expectancy among psychiatric inpatients. Journal of Clinical Psychology 1986;42(4):562–569. [PubMed: 3745453]

Cook MR, Gerkovich MM, O'Connell KA, Potocky M. Reversal theory constructs and cigarette availability predict lapse early in smoking cessation. Research in Nursing & Health 1995;18:217–224. [PubMed: 7754092]

Corcoran, K.; Fischer, J. Measures for clinical practice: A sourcebook. New York: Free Press; 1987.

Craske MG, Street L, Barlow DH. Instructions to focus upon or distract from internal cues during exposure treatment of agoraphobic avoidance. Behaviour Research and Therapy 1989;27(6):663–672. [PubMed: 2575376]

Diehr MC, Heaton RK, Miller W, Grant I. The paced auditory serial addition task (PASAT): Norms for age, education, and ethnicity. Assessment 1998;5:375–387. [PubMed: 9835661]

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Doherty K, Kinnunen T, Militello FS, Garvey AJ. Urges to smoke during the first month of abstinence: Relationship to relapse and predictors. Psychopharmacology 1995;119:171–178. [PubMed: 7659764]

Drummond DC, Cooper T, Glautier SP. Conditioned learning in alcohol dependence: Implications for cue exposure treatment. British Journal of Addictions 1990;85(6):725–743.

Eisenberger R. Learned industriousness. Psychological Review 1992;99:248–267. [PubMed: 1594725]

Fagerstrom KO. Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. Addictive Behaviors 1978;3:235–241. [PubMed: 735910]

Fiore, MC.; Bailey, WC.; Cohen, SJ.; Dorfman, SF.; Goldstein, MG.; Gritz, ER., et al. Treating tobacco use and dependence: Clinical practice guideline. Rockville, MD: U. S. Department of Health and Human Services Public Health Service; 2000.

Foxx RM, Brown RA. Nicotine fading and self-monitoring for cigarette abstinence or controlled smoking. Journal of Applied Behavior Analysis 1979;12(1):111–125. [PubMed: 468744]

Garvey AJ, Bliss RE, Hitchcock JL, Heinold JW, Rosner B. Predictors of smoking relapse among self-quitters: A report from the normative aging study. Addictive Behaviors 1992;17:367–377. [PubMed: 1502970]

Gifford, EV. Setting a course for behavior change: The verbal context of acceptance. In: Hayes, SC.; Jacobson, NS.; Follette, VM.; Dougher, MJ., editors. Acceptance and change: Content and context in psychotherapy. Reno, NV: Context Press; 1994. p. 218-222.

Gifford, EV.; Antonuccio, DO.; Kohlenberg, BS.; Hayes, SC.; Piasecki, MM. Combining bupropion sr with acceptance-based behavioral therapy for smoking cessation: Preliminary results from a randomized controlled trial. Paper presented at the annual meeting of the Association for Advancement of Behavior Therapy; Reno, NV. 2002 Nov.

Gifford, EV.; Hayes, SC. Discrimination training and the function of acceptance. Paper presented at the meeting of the Association for Behavior Analysis; Chicago, IL. 1997 May.

Gifford EV, Kohlenberg BS, Hayes SC, Antonuccio DO, Piasecki MM, Rasmussen-Hall ML, Palm KM. Acceptance-based treatment for smoking cessation. Behavior Therapy 2004;35(4):689–706.

Goldstein, MG. Pharmacotherapy for smoking cessation. In: Abrams, DB.; Niaura, R.; Brown, RA.; Emmons, KM.; Goldstein, MG.; Monti, PM., editors. The tobacco dependence treatment handbook: A guide to best practices. New York: Guilford Press; 2003. p. 230-248.

Grayson JB, Foa EB, Steketee G. Habituation during exposure treatment: Distraction vs attention-focusing. Behaviour Research and Therapy 1982;20(4):323–328. [PubMed: 7126114]

Hajek P, Belcher M, Stapleton J. Breath-holding endurance as a predictor of success in smoking cessation. Addictive Behaviors 1987;12:285–288. [PubMed: 3661283]

Hayes SC, Luoma JB, Bond FW, Masuda A, Lillis J. Acceptance and commitment therapy: Model, processes and outcomes. Behaviour Research and Therapy 2006;44(1):1–25. [PubMed: 16300724]

Hayes, SC.; Strosahl, KD.; Wilson, KG. Acceptance and commitment therapy: An experiential approach to behavior change. New York: The Guilford Press; 1999.

Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom tolerance questionnaire. British Journal of Addiction 1991;86:1119–1127. [PubMed: 1932883]

Holdwick DJ Jr, Wingenfeld SA. The subjective experience of PASAT testing. Does the PASAT induce negative mood? Archives of Clinical Neuropsychology 1999;14(3):273–284. [PubMed: 14590596]

Horvath P. Treatment expectancy as a function of the amount of information presented in therapeutic rationales. Journal of Clinical Psychology 1990;46(5):636–642. [PubMed: 2246373]

Hughes JR. The future of smoking cessation therapy in the United States. Addiction 1996;91(12):1797–1802. [PubMed: 8997761]

Hughes JR, Keely JP, Niaura RS, Ossip-Klein DJ, Richmond RL, Swan GE. Measures of abstinence in clinical trials: Issues and recommendations. Nicotine & Tobacco Research 2003;5:13–25. [PubMed: 12745503]

Jacobson, N. Acceptance and change: Reconsidering the goals of modern behavior therapy. Paper presented at the Panel discussion at the annual meeting of the Association for Advancement of Behavior Therapy; Miami, FL. 1997 Nov.

NIH-PA Author Manuscript NIH-PA Author Manuscript NIH-PA Author Manuscript

Kazdin AE, Krouse R. The impact of variations in treatment rationales on expectancies for therapeutic change. Behavior Therapy 1983;14:657–671.

Kenford SL, Smith SS, Wetter DW, Jorenby DE, Fiore MC, Baker TB. Predicting relapse back to smoking: Contrasting affective and physical models of dependence. Journal of Consulting and Clinical Psychology 2002;70(1):216–227. [PubMed: 11860048]

Lejuez CW, Forsyth JP, Eifert GH. Devices and methods for administering carbon dioxide-enriched air in experimental and clinical settings. Journal of Behavior Therapy and Experimental Psychiatry 1998;29:239–248. [PubMed: 9847043]

Lichtenstein, E.; Brown, RA. Current trends in the modification of cigarette dependence. In: Bellack, AS.; Hersen, M.; Kazdin, AE., editors. International handbook of behavior modification and therapy. New York: Plenum; 1982. p. 575-611.

Marlatt, GA.; Gordon, JR. Relapse prevention: Maintenance strategies in the treatment of addictive behaviors. New York: Guilford Press; 1985.

McCarthy DE, Piasecki TM, Fiore MC, Baker TB. Life before and after quitting smoking: An electronic diary study. Journal of Abnormal Psychology 2006;115(3):454–466. [PubMed: 16866586]

McKay JR. Studies of factors in relapse to alcohol, drug and nicotine use: A critical review of methodologies and findings. Journal of Studies on Alcohol 1999;60(4):566–576. [PubMed: 10463814]

Ockene JK, Emmons KM, Mermelstein RJ, Perkins KA, Bonollo DS, Voorhees CC, Hollis JF. Relapse and maintenance issues for smoking cessation. Health Psychology 2000;19(1):17–31. [PubMed: 10709945]

Palfai TP, Colby SM, Monti PM, Rohsenow DJ. Effects of suppressing the urge to drink on smoking topography: A preliminary study. Psychology of Addictive Behaviors 1997;11(2):115–123.

Patterson F, Jepson C, Kaufmann V, Rukstalis M, Audrain-McGovern J, Kucharski S, Lerman C. Predictors of attendance in a randomized clinical trial of nicotine replacement therapy with behavioral counseling. Drug and Alcohol Dependence 2003;72(2):123–131. [PubMed: 14636967]

Payne TJ, Smith PO, McCracken LM, McSherry WC, Antony MM. Assessing nicotine dependence: A comparison of the Fagerstrom Tolerance Questionnaire (FTQ) with the Fagerstrom Test for Nicotine Dependence (FTND) in a clinical sample. Addictive Behaviors 1994;19(3):307–317. [PubMed: 7942248]

Piasecki TM, Jorenby DE, Smith SS, Fiore MC, Baker TB. Smoking withdrawal dynamics: I. Abstinence distress in lapsers and abstainers. Journal of Abnormal Psychology 2003;112(1):3–13. [PubMed: 12653409]

Pomerleau CS, Carton SM, Lutzke ML, Flessland KA, Pomerleau OF. Reliability of the fagerstrom tolerance questionnaire and the fagerstrom test for nicotine dependence. Addictive Behaviors 1994;19(1):33–39. [PubMed: 8197891]

Quinn EP, Brandon TH, Copeland AL. Is task persistence related to smoking and substance abuse? The application of learned industriousness theory to addictive behaviors. Experimental and Clinical Psychopharmacology 1996;4(2):186–190.

Radloff LS. The CED-D scale: A self-report depression scale for research in the general population. Applied Psychological Measurement 1977 Summer;1:385–401.

Shiffman S. Reflections on smoking relapse research. Drug and Alcohol Review 2006;25(1):15–20. [PubMed: 16492573]

Shiffman S, Hickcox M, Paty JA, Gnys M, Richards T, Kassel JD. Individual differences in the context of smoking lapse episodes. Addictive Behaviors 1997;22(6):797–811. [PubMed: 9426798]

Shiffman S, Scharf DM, Shadel WG, Gwaltney CJ, Dang Q, Paton SM, Clark DB. Analyzing milestones in smoking cessation: Illustration in a nicotine patch trial in adult smokers. Journal of Consulting and Clinical Psychology 2006;74(2):276–285. [PubMed: 16649872]

Shiffman S, Waters AJ. Negative affect and smoking lapses: A prospective analysis. Journal of Consulting and Clinical Psychology 2004;72(2):192–201. [PubMed: 15065954]

Sobell LC, Sobell MB. Validity of self-reports in three populations of alcoholics. Journal of Consulting and Clinical Psychology 1979;46:901–907. [PubMed: 701569]

Sobell, LC.; Sobell, MB. Convergent validity: An approach to increasing confidence in treatment outcome conclusions with alcohol and drug abusers. In: Sobell, LC.; Sobell, MB.; Ward, E., editors. Evaluating

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alcohol and drug abuse treatment effectiveness: Recent advances. New York: Pergamon Press; 1980. p. 177-183.

Sobell, LC.; Sobell, MB. Timeline followback: A calendar method for assessing alcohol and drug use. Toronto, Canada: Addiction Research Foundation; 1996.

Strasser AA, Kaufmann V, Jepson C, Perkins KA, Pickworth WB, Wileyto EP, Rukstalis M, et al. Effects of different nicotine replacement therapies on postcessation psychological responses. Addictive Behaviors 2005;30(1):9–17. [PubMed: 15561445]

Titchener, EB. A text-book of psychology. New York: MacMillan; 1916.

USDHHS. The health consequences of smoking: Nicotine addiction: A report of the surgeon general. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service Office on Smoking and Health; 1988.

USDHHS. The health consequences of smoking: A report of the surgeon general. Atlanta, GA: Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease and Prevention and Health Promotion, Office on Smoking and Health; 2004.

Warner KE, Burns DM. Hardening and the hard-core smoker: Concepts, evidence, and implications. Nicotine & Tobacco Research 2003;5(1):37–48. [PubMed: 12745505]

Wilson, KG.; Groom, J. The valued living questionnaire. Oxford: University of Mississippi; 2002.

Wilson, KG.; Murrell, AR. Values work in acceptance and commitment therapy: Setting a course for behavioral treatment. In: Hayes, SC.; Follette, VM.; Linehan, MM., editors. Mindfulness and acceptance: Expanding the cognitive-behavioral tradition. New York: Guilford Press; 2004. p. 120-151.

Zvolensky MJ, Baker KM, Leen-Feldner E, Bonn-Miller MO, Feldner MT, Brown RA. Anxiety sensitivity: Association with intensity of retrospectively-rated smoking-related withdrawal symptoms and motivation to quit. Cognitive Behavior Therapy 2004;33(3):114–125.

Biography

Richard A. Brown, PhD, is Associate Professor of Psychiatry and Human Behavior at the Warren Alpert Medical School of Brown University and Director of Addictions Research at Butler Hospital. His research in addictive disorders has focused on early lapse and distress tolerance in smoking cessation, the comorbidity of depression and smoking in adults and adolescents and exercise interventions for addictive disorders.

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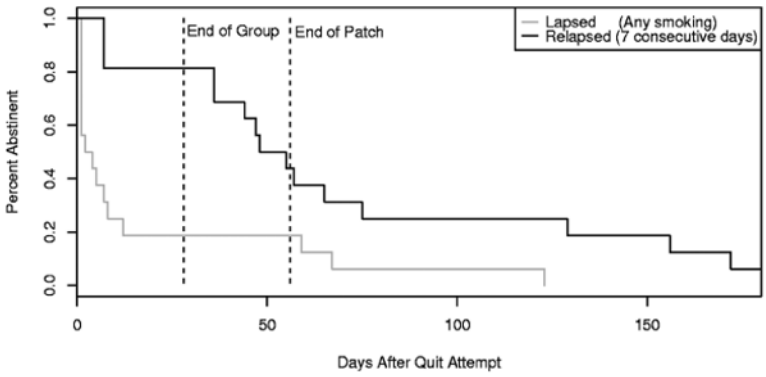

Figure 1. Plot of time to first lapse and relapse in the days following a quit attempt

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Table 1

Distress Tolerance Treatment Overview

Week	Session Number	Format	Standard Treatment Components	Distress-Tolerance Treatment Components
1	1	Individual		Values clarification Therapeutic contract
2	2	Individual	Smoking history	Introduce rationale of control as the problem
3	3 and 4	Group	Identifying Triggers	Treatment rationale Nicotine fading
4	5 and 6	Group/individual	Self-management skills	Acceptance/defusion skills Scheduled abstinence Cue exposure Skills practice
5	7 and 8	Group/individual	Planning for quit day	Scheduled abstinence Exposure Acceptance/defusion skills
6	9 and 10	Group/individual	Quit week NRT	Skills practice Self-as-context
7	11 and 12	Group/individual	NRT Relapse prevention skills	Skills practice Values clarification Assertiveness skills
8	13	Group	NRT Relapse prevention skills	Exposure Committed action Willingness
9	14	Group	NRT Relapse prevention skills	Committed action Willingness
10	15	Group	NRT Relapse prevention skills	Committed action Planning for the future

Note: NRT = Nicotine replacement therapy.

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Table 2

Demographic, Smoking, and Affect-Related Variables (*N* = 16)

Variable	*M*	*SD*
Age	41.94	10.50
FTND total score	6.75	1.84
Age of smoking initiation	12.50	3.12
Years of regular smoking	26.25	10.17
Average cigarettes/day	20.37	3.92
CES–D	15.38	13.73

Note: FTND = Fagerstrom Test of Nicotine Dependence. CES-D = Center for Epidemiological Studies-Depression Scale.