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Distress tolerance and early smoking lapse*

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Abstract

A significant percentage of smokers attempting cessation lapse to smoking within a matter of days and very few of these individuals recover to achieve abstinence. Current models of relapse devote insufficient attention to this phenomenon of early smoking lapse. Furthermore, studies attempting to relate severity of nicotine withdrawal symptoms to short-term smoking cessation outcomes have yielded equivocal results. The authors argue that how one *reacts* to the discomfort of nicotine withdrawal is a more promising avenue of investigation than severity of withdrawal and that inability to tolerate the distress of nicotine withdrawal and associated negative affect is a key factor in early smoking lapse and subsequent relapse. Theoretical and clinical implications of distress tolerance in smoking cessation are discussed and the development of a specialized and novel behavioral distress tolerance treatment for early smoking lapsers is proposed.

Keywords

Adult; Smoking cessation; Psychology; Tobacco dependence; Nicotine withdrawal; Smoking relapse; Distress tolerance; Stress; Human; Personality assessment; Psychotherapy, group; Treatment outcome

1. Introduction

Cigarette smoking is the leading cause of death and disability in the United States, accounting for over 440,000 deaths in the United States every year (USDHHS, 2004), yet over 45 million adult Americans continue to smoke cigarettes every day (Control, 2004). This strong relationship between smoking and morbidity and mortality, and the clear benefits of successful cessation (USDHHS, 1990), have stimulated a great deal of interest in smoking cessation research. However, despite the desire of 70% of smokers to quit (Control, 1994), the 1 year quit ratio in the general smoking population is under 1% (Fiore, Novotny, Pierce, et al., 1989), and approximately 90–95% of smokers who quit on their own (Cohen et al., 1989) and 70–85% who attend treatment programs relapse within 1 year (Fiore, Bailey, & Cohen, 2000).

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The selection hypothesis of smoking prevalence argues that smokers who are unable to quit successfully are likely to possess risk factors or characteristics that make it difficult to quit (Coombs, Kozlowski, & Ferrence, 1989; Hughes, 1995; Irvin & Brandon, 2000; Irvin, Hendricks, & Brandon, 2003). Although existing epidemiological evidence is equivocal regarding population level increases in levels of dependence (USDHHS, 2003), significant populations of at-risk, recalcitrant smokers remain (Augustson & Marcus, 2004) and efforts to develop treatments tailored to high-risk populations remain a national priority (USDHHS, 2003). In a review of available clinical trials conducted between 1975 and 1996, Irvin & Brandon (2000) documented a robust decrease in the abstinence rates achieved by intensive cognitive-behavioral smoking cessation interventions. Significant strides in smoking cessation ultimately may be found in the ability to develop specialized treatments that target the particular needs of subgroups of smokers, especially those who are at higher risk for relapse, rather than in expecting any single treatment approach to be a panacea (Brown, 2003a; Lichtenstein & Glasgow, 1992; Niaura & Abrams, 2002; Shiffman, 1993).

In the present article, we will highlight the importance of “early smoking lapse”, based upon the observation that a significant proportion of smokers attempting to quit will relapse within a matter of hours or days of their cessation attempt. In discussing the issues of smoking lapse and relapse, we use the term “lapse” to indicate an instance of smoking (even a puff of a cigarette) and “relapse” to indicate a return to one’s baseline level of smoking. We present data suggesting that early smoking lapse following a cessation attempt is a common occurrence, and one that we believe has not received sufficient attention in the smoking treatment literature. Furthermore, we propose that the majority of smokers who lapse within a matter of hours or within days of a cessation attempt may be responding to a combination of physical and psychological discomfort to the nicotine withdrawal syndrome (Hughes, Higgins, & Hatsukami, 1990) that reliably accompanies the initial stages of smoking cessation. These individuals may be characterized by their reduced ability to tolerate the physical discomfort and negative affect associated with nicotine withdrawal and by their lack of persistence in the face of this discomfort.

Baker, Piper, McCarthy, Majeskie, and Fiore (2004) have recently offered a reformulated model of negative reinforcement in addiction, proposing that negative affect is the “motivational core” of the withdrawal syndrome. We agree with this model, and further posit that there are individual differences in how smokers respond to negative affect, and it is these responses in the face of negative affect that determine who lapses and who maintains abstinence. We present data supporting these assumptions and propose that a specialized behavioral treatment for these “early smoking lapsers” is indicated, and would feature components to assist them in learning skills to increase their ability to tolerate discomfort and negative affect and to persist despite experienced discomfort at the task of remaining abstinent from smoking.

2. Relapse prevention and the significance of early smoking lapse

In light of high smoking relapse rates (Brownell, Marlatt, Lichtenstein, & Wilson, 1986; Garvey, Hitchcock, & Bliss, 1987; Hunt & Bespalec, 1974), Marlatt and Gordon’s (1985) social learning-based (Bandura, 1977), relapse prevention model has stimulated considerable research. The relapse prevention model proposes that an individual’s ability to cope successfully with situational factors that may precipitate relapse, and to develop a more balanced lifestyle are the key factors that determine the probability of smoking relapse. Unfortunately, despite the prospect of improved treatment outcomes (Lichtenstein & Brown, 1982), the success of smoking treatment programs derived from the relapse prevention model has been limited (Glasgow & Lichtenstein, 1987; Kahler, Zvolensky, Goldstein, & Brown,

2003; Shiffman, 1993). Consequently, researchers have called for new behavioral approaches to smoking cessation (Niaura & Abrams, 2002).

Although the relapse prevention model has inspired treatments that focus on situational influences on relapse during the first 3 to 6 months after quitting (Marlatt & Gordon, 1985), it has become increasingly clear that lapses to smoking occur very early in many cessation attempts. For example, in studies of people who quit on their own, approximately one-third to one-half smoke within a few days and 50–60% smoke within the first 2 weeks (Garvey, Bliss, Hitchcock, Heinold, & Rosner, 1992; Gulliver, Hughes, Solomon, & Dey, 1995; Ward, Klesges, Zbikowski, Bliss, & Garvey, 1997). Early lapse is also common among participants who receive formal smoking cessation treatment. In a large study using telephone-assisted interventions, 59%, 54% and 49% smoked by the end of the first week for self-help, single and multiple phone contact groups, respectively (Zhu et al., 1996). Similarly, Cook, Gerkovich, O'Connell, and Potocky (1995) found that of a sample of 68 individuals attempting to quit smoking within a community-based clinic, 47% had smoked by the end of the first week. Studies examining nicotine replacement strategies or group-based cessation intervention produce a slight improvement; however, 43–50% of participants still smoke within the first week (Schneider et al., 1995, 1996) and most of the lapses occur within the first few days (Doherty, Kinnunen, Militello, & Garvey, 1995; Shiffman et al., 2000, 1997). Our own work in a cessation trial of smokers with past major depressive disorder (MDD) (Brown, Kahler, Niaura et al., 2001) revealed that 37% of participants lapsed on the planned quit date (Brown, Herman, Ramsey, & Stout, 1998) and 100 of the 171 participants (58.5%) smoked within the first week after quit date.

Not only are early lapses common, but the vast majority of smokers who experience a smoking lapse ultimately progress to a full relapse. In studies following self-quiters and studies using nicotine replacement, it is estimated that more than 85% of participants who experienced an early lapse subsequently progressed to a full-blown relapse by the end of the study period (Brandon, Tiffany, Obremski, & Baker, 1990; Garvey et al., 1992; Gourlay, Forbes, Marriner, Pethica, & McNeil, 1994; Hurt et al., 1994; Kenford, Fiore, & Jorenby, 1994; Norregaard, Tonnesen, & Petersen, 1993; Schneider et al., 1996). In more intensive cognitive-behavioral group treatments, the most significant predictor of relapse after 4 months was lapsing at some point between quit day and 4-month follow-up (Nides et al., 1995). Most smokers who lapse to smoking resume regular smoking within 24 h after this first smoking episode (Ward et al., 1997). In the Brown et al. (2001) study of smokers with past MDD, only 10% of the 100 participants who lapse during the first week were abstinent at the 6-month follow-up, compared to 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 vs. 45.1% for the first week abstainers. These statistically significant differences are also quite clinically significant.

Thus, convergent evidence from smoking cessation trials with differing populations and treatment modalities suggest that relapse prevention strategies that focus on situational precipitants of relapse occurring over a period of weeks or months following cessation may not be well-suited to a large percentage of smokers who need to focus more intensively on the first hours and days of smoking cessation. Early lapses to smoking are both frequent and highly predictive of subsequent (full-blown) relapse. We believe that current models of relapse devote insufficient attention to the phenomenon of early lapse.

The prevalence of early smoking lapses and their detrimental effect on cessation outcomes raises a number of important questions. Why are early lapses so prevalent across methods of quitting and treatment modality? What factors are likely to be most uniquely influential in remaining abstinent during the first days of a cessation attempt? What factors distinguish those

smokers who can successfully quit for at least several days from those who, despite repeated attempts, have never been able to abstain for more than a few hours or days? There are many potential answers to these questions and we do not purport to provide a comprehensive discussion of all the possible responses. However, given that the early stages of smoking cessation are marked by a prominent syndrome of withdrawal that begins within hours of quitting, peaks within the first few days, and largely resolves within the first 2 to 3 weeks (Hughes et al., 1990), our examination centers primarily on the ways in which smokers' responses to nicotine withdrawal are related to early lapse. We focus specifically on the role of negative affect during withdrawal and argue that individual differences in the ability to tolerate and persist in smoking cessation despite affective discomfort may be a key determinant of early success in smoking cessation attempts.

3. Potential mechanisms of early smoking lapse

3.1. Withdrawal symptom severity

Given the emergence of both physiological and psychological symptoms that occurs within hours of nicotine deprivation (Hughes et al., 1990), severity of nicotine withdrawal might be expected to be the strongest predictor of early lapse and subsequent relapse. Since the 1988 Surgeon General's report affirmed the role of nicotine dependence in the initiation and maintenance of cigarette smoking (USDHHS, 1988), nicotine withdrawal has been an emerging focus of scientific investigation (Hughes, 1992; Hughes, Gust, Skoog, Keenan, & Fenwick, 1991; West, Hajek, & Belcher, 1989). Patten and Martin (1996) reviewed 15 prospective studies (Covey, Glassman, & Stetner, 1990; Gritz, Carr, & Marcus, 1991; Gunn, 1986; Hall, Ginsberg, & Jones, 1986; Hall, Havassy, & Wasserman, 1990; Hughes, 1992; Hughes et al., 1991; Hughes & Hatsukami, 1986; Kenford et al., 1994; Norregaard et al., 1993; Persico, 1992; Robinson, Pettice, & Smith, 1992; Stitzer & Gross, 1988; Swan & Denk, 1987; West et al., 1989) that attempted to determine whether the severity of nicotine withdrawal was predictive of smoking cessation and relapse. They concluded that overall, the results of these studies were equivocal, as only 6 (Covey et al., 1990; Gritz et al., 1991; Gunn, 1986; Persico, 1992; Robinson et al., 1992; West et al., 1989) of the 15 studies showed a relationship between withdrawal and smoking outcome. Among those studies that focused exclusively on short-term outcomes (and would thus be relevant to the issue of early lapse), results were similarly equivocal (Patten & Martin, 1996). Thus *severity* of nicotine withdrawal symptoms alone does not appear to be a key determinant of early lapse to smoking and increasingly factors that may moderate the relationship between withdrawal and relapse have been the focus of research.

3.2. Affective factors

More recent work indicates it is the affective components of nicotine withdrawal that are critical to our understanding of the relationship between withdrawal and smoking outcomes. Piasecki, Kenford, Smith, Fiore, and Baker (1997) have examined in depth the course of nicotine withdrawal and its components in relation to early lapse. In an initial study, these investigators found that a set of affective measures was superior to measures of physical dependence in predicting relapse. In a second study, Piasecki et al. (2000) attempted to replicate these findings in a sample of unaided quitters. Temporal variability in negative affect factor scores was more robustly related to smoking cessation outcomes than was variability in the other withdrawal factor domains. Kenford et al. (2002) compared the ability of a traditional model of physical dependence to an affective model in predicting relapse back to smoking at 6 months postquit in 505 heavy smokers participating in nicotine patch clinical trials. Results were supportive of both models, but the strongest predictor of cessation outcome was postquit negative affect, which accounted for much of the predictive validity of traditional measures of nicotine dependence. Recent work by Piasecki and colleagues (Piasecki, Jorenby, Smith, Fiore, &

Baker, 2003a, 2003b, 2003c) supports the high degree of individual variability in the severity, course, and day-to-day volatility of both pre- and post-cessation nicotine withdrawal symptoms. The degree of volatility in withdrawal symptoms is a strong predictor of relapse (Piasecki et al., 2003b) and pharmacotherapies do not appear to impact this clinically important aspect of post-cessation withdrawal (Piasecki et al., 2003c). Conceptual models of relapse highlight individual differences in the affective-motivational processes that shape *variability* rather than *severity* of the nicotine withdrawal syndrome both before and after attempts at cessation (Baker, Brandon, & Chassin, 2004; Piasecki et al., 2003c).

This recent work indicating the importance of affective symptoms during nicotine withdrawal is consistent with a great deal of research supporting the prominent role of negative affect in smoking relapse. Prospective studies have shown that affective distress at the beginning of treatment (Kinnunen, Doherty, Militello, & Garvey, 1996) and after quitting (Covey et al., 1990; Ginsberg, Hall, Reus, & Muñoz, 1995; West et al., 1989) predicts poor outcome. Furthermore, in retrospective studies, smokers consistently report that relapse to smoking often occurs in situations involving negative moods such as anxiety, anger, and depression (Bliss, Garvey, Heinold, & Hitchcock, 1989; Brandon et al., 1990; Marlatt & Gordon, 1980; Shiffman, 1982), and lapses in negative affect situations are more likely to lead to complete relapses (O'Connell & Martin, 1987). Smokers who smoke more frequently in negative affect situations (O'Connell & Shiffman, 1988; Pomerleau, Adkins, & Pertschuk, 1978) and are less effective at managing negative affect (Abrams et al., 1987; Kamarck & Lichtenstein, 1988) are more likely to relapse. Most recently, Shiffman & Waters (2004) found that surges in negative affect often began a few hours before a smoking lapse occurred. Thus, it may be the responses to acute stressors and resulting rapidly increasing negative affect that are most relevant to relapse. Rapid increases in negative affect may be particularly likely during nicotine withdrawal.

The finding that negative affect during nicotine withdrawal is related to smoking outcome is not surprising as affect has important motivational properties (Cox & Klinger, 1988). The reduction of negative affect through smoking is a powerful motive to smoke, and as smokers become more dependent, there may be a shift in the motivational basis of their smoking from external, contextual motives towards smoking to reduce craving and negative affect (Baker, Brandon et al., 2004). In fact, negative reinforcement of smoking through reduction in negative affect may be common to virtually all smokers and has been hypothesized as the prepotent motive for addictive drug use (Baker, Piper et al., 2004). Some smokers, such as those with a history of MDD (Ginsberg et al., 1995) or anxiety disorder (Zvolensky, Lejuez, Kahler, & Brown, 2004; Zvolensky, Schmidt et al., in press) may be particularly prone to strong affective reactions to nicotine withdrawal and therefore may be particularly prone to early lapse. Individuals who have a history of repeated early lapses do appear to have higher scores on a trait measure of the tendency to respond to stress with negative affect and show particularly large increases in negative affect when deprived of nicotine compared to those with a history of sustained quit attempts (Brown, Lejuez, Kahler, & Strong, 2002).

Although most smokers who attempt to quit smoking experience craving and negative affect upon quitting, many successfully resist the urge to smoke. On the other hand, others may experience only mild negative affect but quickly return to smoking. That is, some smokers "tolerate" the discomfort of quitting and forego negative reinforcement available through smoking whereas others do not. We believe that individual differences in the degree of *tolerance* of the discomfort of nicotine withdrawal during a smoking abstinence attempt are a promising avenue of investigation and may have important treatment implications. We argue that a comprehensive picture of vulnerability to early smoking lapse requires an understanding not only of the important role of the course of affective components of nicotine withdrawal, but also requires *an examination of individual differences in response to negative affect*.

4. Distress tolerance and early smoking lapse

Emerging evidence regarding the construct of distress tolerance suggests that it is not just the severity or intensity of nicotine withdrawal, but also how an individual *responds* to discomfort and distress that predicts early smoking lapses. Early lapsers may be characterized by a tendency towards negative affect during nicotine withdrawal and also an inability to tolerate negative affect. We have previously referred to this combination as a “double whammy” with regard to early lapse in quitting smoking (Brown et al., 2002).

We utilize the term distress tolerance to convey a behavioral tendency to continue to pursue a goal despite encountering various states of affective discomfort, which may be in response to perceived physical and/or psychological distress. Ultimately, the ability to tolerate the initial physical discomfort and psychological stress of nicotine withdrawal involves foregoing the powerful and immediate negative reinforcement potentially available through reduction of withdrawal via smoking (Baker, Piper et al., 2004) and instead opting for the less immediate, longer-term positive reinforcement of smoking cessation. The term “task persistence” serves to define the behavioral aspect of distress tolerance (Brandon et al., 2003; Quinn, Brandon, & Copeland, 1996) and derives from learned industriousness theory (Eisenberger, 1992) which posits that the amount of effort exerted toward goal-directed behavior is influenced by one's reinforcement history for such effort. However, the ability to tolerate discomfort and persist at a task such as quitting smoking is likely to involve a confluence of other inter-individual factors. For example, the literature on self-efficacy (Bandura, 1997) and on motivation (Miller & Rollnick, 2002) and readiness (Prochaska & Velicer, 1997) for change in the addictive disorders is well documented, and these influential factors may represent a type of final common pathway that precedes successful smoking cessation. In the context of examining the issue of distress tolerance as a reaction or behavioral response to negative affect, we review the literature on two constructs which we believe may play a role in individual differences in the ability to tolerate discomfort and persist at the goal of quitting smoking: anxiety sensitivity and experiential avoidance.

4.1. Distress tolerance

Whereas many smokers quit smoking successfully despite high levels of discomfort, it is likely that a low threshold for tolerating such unavoidable types of distress would be associated with increased smoking behavior [i.e., the smoking response temporarily ameliorates the experiential discomfort (Parrott, 1999)] and increased difficulty quitting smoking. In fact, in a cross-sectional study, smokers demonstrated less task persistence than nonsmokers when presented with frustrating cognitive and motor tasks (Quinn et al., 1996). Thus while smokers were found to be lower on task persistence than nonsmokers, convergent evidence suggests that there may be important difference *among* smokers that may play a key role in the success of their smoking cessation efforts.

In a series of innovative studies, Hajek and colleagues (Hajek, 1991; Hajek, Belcher, & Stapleton, 1987; West et al., 1989) have found consistent positive associations between duration of breath-holding, as an index of tolerance for physical discomfort, and duration of abstinence from smoking. The authors suggest that “breath-holding endurance and resistance to withdrawal discomfort could both involve the same kind of subjective criteria of what is unbearable and when to stop trying” (Hajek et al., 1987; p. 285). In our own laboratory, we have replicated these breath-holding findings in two different studies of distress tolerance, task persistence and early smoking lapse (Brown et al., 2002, 2004).

In our laboratory study of current smokers who by quit attempt history were either immediate (had never quit for more than 24 h) vs. delayed relapsers (had quit for at least 3 months) (Brown et al., 2002), we assessed individuals' distress tolerance, as indexed by their persistence on

psychological and physical challenge tasks. The physical challenge tasks consisted of inhalations of carbon dioxide (CO₂) enriched air and of a timed, breath-holding procedure, while the psychological challenge consisted of the completion of a stressful version of the Paced Auditory Serial Addition Task (PASAT), a mental arithmetic challenge task. To examine task persistence, participants were given the option of terminating each challenge task prior to its scheduled end point. The results indicated that immediate relapsers were more likely to terminate the CO₂ [AOR (adjusted odds ratio) = 12.2] and PASAT challenges (AOR = 4.6) and had a shorter duration of breath-holding than delayed relapsers. These findings are noteworthy in that the two groups did not differ on smoking or nicotine dependence variables. However, a limitation of this study was the reliance on retrospective self-reports of quitting histories to determine the groups based on past relapse status.

Following these studies, Brandon et al. (2003) assessed the predictive utility of persistence on behavioral tasks to relapse following treatment for smoking. One hundred and forty-four smokers were assessed on cognitive ability, negative affect, and persistence just prior to commencing smoking cessation treatment. The behavioral tasks used to assess persistence included an anagram test (ATP) and a mirror tracing (MTPT) test. The subjects were broken down into three groups, treatment non-completers, those who completed treatment but relapsed back to smoking (lapsers), and those who sustained abstinence until follow-up (abstainers). The MTPT was found to be a significant predictor of sustained abstinence while the ATP was not. Mean persistence times on the MTPT increase monotonically across nonsmokers, abstainers, and lapsers. Level of smoking and gender also predicted sustained abstinence, such that heavier smokers and women were significantly more likely to lapse sooner. In a multivariate analysis, MTPT continued to significantly predict sustained abstinence even after controlling for smoking severity and gender among both intent to treat and treatment completers.

In a recently completed study (Brown et al., 2004, February), we attempted to replicate and extend these findings by administering the same challenge tasks used in our prior distress tolerance study (Brown et al., 2002) to a group of smokers, motivated for cessation, prior to their unaided quit attempts. A total of 81 participants were recruited and followed for 28 days as they made an unaided quit attempt. Of the 81 participants who completed baseline assessments, we obtained verified follow-up data on the day of initial lapse or verified abstinence for 77 (95.1%) participants. Of these, 16 (20.8%) successfully remained abstinent for the full 28-day follow-up. Of the 61 participants who slipped, 25 (41.0%) slipped within the first day and a total of 50 (82.0%) slipped within the first week. Data indicated that persistence on the two physical stressors (breath-holding and CO₂ persistence), but not the psychological stressor (PASAT), was significantly associated with reduced risk of lapsing. Further, simultaneously considering breath-holding and CO₂ persistence indicated that both measures might have unique effects on outcome. Following from this suggestion, we created a composite score for breath-holding and CO₂ persistence by adding the two dichotomized variables to form three groups: low persistence (low persistence on both tasks; $n = 24$), average persistence (high persistence on one of the tasks; $n = 37$), and high persistence (high persistence on both tasks; $n = 20$). Continuous abstinence rates at 7 days were 22.7%, 30.6%, and 57.9% across the respective groups and dropped to 4.6%, 25.0%, and 31.6%, respectively by 28 days. Proportional hazards models conducted using dummy codes for persistence group and controlling for gender and history of MDD indicated that those low in persistence had 2.94 times higher risk of lapsing during follow-up relative to those with high persistence. Those with low persistence had 1.75 times greater risk of lapsing relative to those with average persistence, a difference that approached traditional significance levels. Although those with average persistence had 1.68 times the risk of lapsing relative to those with high persistence, this effect did not reach statistical significance.

Taken together, these data indicate that some combination of psychological and physical distress tolerance, as indexed by limited persistence on novel laboratory challenge tasks, may underlie early smoking lapse. The extent to which one tolerates discomfort is likely to be influenced by how one appraises the significance of those internal states and is motivated to avoid them. In this way, a focus on appraisal and avoidance of internal states may have some relevance to the issue of distress tolerance and early smoking lapse. The concept of anxiety sensitivity focuses on vigilance for and fear of internal states. In short, the higher one is on anxiety sensitivity and the more prone one is to engage in emotional avoidance, the more likely one is to use escape options when distressed.

4.2. Anxiety sensitivity and response to interoceptive stimuli

Anxiety sensitivity is a stimulus–outcome expectancy that reflects relatively stable individual differences in the propensity to experience fear in response to internal sensations (Peterson & Reiss, 1992; Reiss & McNally, 1985). Given the established link between anxiety sensitivity and emotional reactivity to interoceptive (i.e., internal physiological) cues (Schmidt, Lerew, & Trakowski, 1997), it is possible that this cognitive factor may be related to problems in quitting smoking, particularly early smoking lapse. The core rationale driving this work is that for smokers high in anxiety sensitivity, interoceptive sensations such as those experienced during nicotine withdrawal may be perceived as distressing, promoting affective states of anxiety, bodily tension and worry. Consistent with this perspective, smokers high compared to low in anxiety sensitivity are at significantly greater risk for affective problems; importantly, these effects are above and beyond alcohol use and negative affectivity (Zvolensky, Kotov, Antipova, & Schmidt, 2003). Without a more adaptive affect regulation strategy, smokers high in anxiety sensitivity may tend to rigidly rely on, or resort to, smoking in order to temporarily escape from these distressing interoceptive states (Kassel & Shiffman, 1997). Accordingly, indices of pre-quit levels of anxiety sensitivity may help identify persons most likely to lapse during early stages of a quit attempt (e.g., first week), a time period when individuals are most apt to experience anxiety and other negative affective symptoms (Hughes et al., 1990).

A number of studies have provided general, but not uniform, support for the role of anxiety sensitivity in the maintenance of smoking. We examined whether anxiety sensitivity was related to negative reinforcement smoking motives (i.e., smoking to reduce negative affect) and increased risk of relapse during the early stages of a quit attempt in a sample ($n = 60$) of smokers with past major depressive disorder (MDD) (Brown, Kahler, Zvolensky, Lejuez, & Ramsey, 2001). Consistent with expectations, anxiety sensitivity was significantly associated with smoking to reduce negative affect but was not significantly associated with smoking for other reasons. Higher levels of anxiety sensitivity also were associated with increased risk of lapsing during the first 7 days after quit day. Conceptually in line with the results of this study and the anxiety sensitivity theory more generally, other cross-sectional investigations have found that smokers with high levels of anxiety sensitivity are: (1) motivated to smoke to manage negative moods (Comeau, Stewart, & Loba, 2001; Novak, Burgess, Clark, Zvolensky, & Brown, 2003; Stewart, Karp, Pihl, & Peterson, 1997); (2) expect smoking to reduce negative affect (Zvolensky, Feldner et al., 2004); and (3) report affective problems during quitting (Zvolensky, Baker et al., 2004).

Collectively, the extant literature, although relatively small in overall size, provides initial empirical evidence that smokers with heightened levels of anxiety sensitivity may smoke more often to manage negative moods, expect smoking to alleviate negative affect and may be less able to tolerate early withdrawal symptoms, specifically during early stages of a quit attempt. To further strengthen confidence in these studies, it will be important for future work to evaluate the role of anxiety sensitivity in prospective studies and track associations between this factor and theoretically relevant affective processes.

4.3. Experiential avoidance

Experiential avoidance “occurs when a person is unwilling to remain in contact with particular private experiences (e.g., bodily sensations, emotions, thoughts, memories, behavioral dispositions) and takes steps to alter the form or frequency of these events and the contexts that occasion them, even when doing so creates harm” (Hayes, 2004, p. 14). Efforts to control or suppress private experience may be a problematic method of coping for a certain percentage of smokers. These smokers, in an effort to escape the uncomfortable negative affect and symptoms of nicotine withdrawal that emerge within hours of smoking cessation, may readily resort to the calming effects of nicotine (Piasecki, Fiore, & Baker, 1998) for relief. Such efforts to avoid or escape would be maintained by negatively reinforcing effects such as the reduction of urges or negative affect.

Coping efforts directed at modifying or avoiding troublesome internal states are likely to be problematic. Hayes, Wilson, Gifford, Follette, and Strosahl (1996) provide a thorough discussion of experiential avoidance in relation to clinical syndromes and present compelling evidence of the ineffectiveness of experiential avoidance in such problems as substance abuse and dependence, obsessive-compulsive disorder, panic disorder with agoraphobia, borderline personality disorder, suicidality and the sequelae of childhood sexual abuse.

Further evidence of the problematic consequences of efforts to control thoughts and feelings may be gleaned from laboratory research in experimental psychopathology. In one study examining the interaction between instructions to suppress thoughts and thought frequency, Wegner, Schneider, Carter, and White (1987) found that deliberate attempts to suppress target thoughts increased the occurrence of these thoughts. In other studies examining thought suppression, some have found an immediate increase in thought frequency when suppression is attempted (Lavy & van den Hout, 1990; Merkelbach, Muris, van den Hout, & de Jong, 1991) while others have found that efforts to suppress succeed in the short term but ultimately result in a “rebound effect” (Clark, Ball, & Pape, 1991; Clark, Winton, & Thynn, 1993). In one such laboratory study relevant to smoking cessation, the investigators found that deliberate attempts by smokers to suppress intrusive thoughts related to smoking resulted in increases in the frequency of these thoughts relative to control conditions (Salkovskis & Reynolds, 1994). The investigators concluded that these types of thought suppression effects may increase the difficulty of smoking cessation.

Taken together, there are at least three sources of evidence indicating that how one responds to affective distress is an important element to smoking lapse and relapse. This work can be distinguished from studies that focused exclusively on negative affect in that it places a greater explanatory emphasis on the regulation of and sensitivity to affect, rather than solely on the level of affective symptoms being reported or expressed. Although this work is naturally at an early stage of research development, these constructs suggest that a different therapeutic approach could be utilized in the context of smoking cessation. We elaborate on the clinical applications of this work below to underscore its potential utility in smoking cessation clinical practice and research and practice, specifically for smokers who have repeatedly failed to sustain quit smoking attempts beyond a matter of days (i.e., early lapsers).

5. Development of a novel smoking cessation treatment for early smoking lapsers

Given that the cognitive-affective response to distress may be at the core of early smoking lapse, it is crucial to develop novel treatment strategies for smokers with a history of repeated early lapses that helps smokers tolerate the short-term discomfort associated with acute cessation. In the following section, we outline the development of a “distress tolerance

treatment". We expect that any such treatment would include components of standard smoking cessation treatment, both behavioral and pharmacological, and we discuss these components first. We then discuss specific treatment elements to address the tolerance for the affective components of withdrawal, including components derived from exposure-based procedures for anxiety-related disorders and from Acceptance and Commitment Therapy.¹

5.1. Standard behavioral smoking cessation treatment

The cognitive social learning approach (Bandura, 1997) provides the best framework for conceptualizing smoking cessation interventions. The social learning model views smoking as a learned behavior acquired through classical and operant conditioning principles and cognitive (symbolic) processes, including modeling others' behavior, self-control mechanisms (goal setting, self-monitoring, self-evaluation, self-correction), beliefs, self-efficacy, and outcome expectations (Brown & Emmons, 1991). Behavioral smoking cessation interventions derived from the social learning model have traditionally been the most efficacious (Lichtenstein & Brown, 1982), and this state of affairs has continued to the present (Fiore et al., 2000). These behavioral treatments have generally employed a multicomponent approach consisting of three interrelated phases: preparation, quitting and maintenance of cessation or preventing relapse. Multicomponent approaches have generally achieved long-term (12-month follow-up) abstinence rates of approximately 25–30% (Fiore et al., 2000). Nonetheless, the majority of smokers receiving a multicomponent approach relapse within 1 year, and we suggest that those smokers prone to early lapse (as indexed by their history of lapsing early) require treatment components that are tailored to address the issue of reactivity to distress in the early quit period. A complete review of the components that are included in a standard behavioral multicomponent treatment is beyond the scope of this review, but a complete description of these components has recently been published (Brown, 2003b) and is based upon a standard behavioral protocol which yielded very positive outcomes in smokers with past MDD (Brown, Kahler, Niaura et al., 2001).

5.2. Pharmacotherapy or nicotine fading alternative

The evidence-based clinical practice guidelines for tobacco cessation published by the U.S. Public Health Service (Fiore et al., 2000) conclude that pharmacotherapy be included as a treatment recommendation for all smokers planning to quit smoking in the next 30 days. For smokers for whom pharmacotherapy is contraindicated or who prefer to attempt cessation without pharmacotherapy, we briefly discuss nicotine fading as a behavioral alternative. Since we are conceptualizing early smoking lapse in the context of reactivity to experienced discomfort from psychological and physical 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 a multicomponent approach for early smoking lapsers.

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). While detailed discussion of the use of these pharmacotherapies is beyond the scope

¹It should be noted that the first two novel classes of treatment components are intended to address the reactivity to negative affective experiences, rather than to reduce the negative affect per se. We believe that it is the reactivity to negative affect that is unique to early smoking lapsers and suggest that this reactivity is the most fruitful target for intervention. Another alternative would be to attempt to reduce negative affect through components like cognitive-behavioral treatment for depression (Beck, Rush, Shaw, & Emery, 1978) or behavioral activation (Jacobson et al., 1996; Lejuez, Hopko, & Hopko, 2001). The former has been evaluated in smoking cessation and has not demonstrated efficacy in reducing depressive symptoms in this context (Brown, Kahler, Niaura et al., 2001; Hall, Muñoz, & Reus, 1994; Hall et al., 1998). However the latter approach, behavioral activation, has not been previously evaluated for use in smoking cessation and may be more promising.

of this review, evidence for their efficacy (Fiore et al., 2000) and a discussion of their relative merits and clinical usage (Goldstein, 2003) can be found elsewhere.

Although not considered a first-line pharmacotherapy for tobacco dependence (Goldstein, 2003), and not FDA approved for the indication of tobacco dependence, fluoxetine hydrochloride, an selective serotonin reuptake inhibitor (SSRI), warrants consideration in the treatment of early smoking lapsers due to findings of improved efficacy in smoking outcomes for smokers with elevated depressive symptoms (Blondal et al., 1999; Hitsman et al., 1999). While fluoxetine merits consideration given the connection between early smoking lapse and negative affect (cf. Brown et al., 2002), this perspective should be balanced against the lower overall efficacy rates achieved with fluoxetine (Niaura et al., 2002) as compared to the first-line pharmacotherapies cited above (Fiore et al., 2000).

Nicotine fading is a behavioral alternative to pharmacotherapy that addresses both pharmacological and psychological factors (Foxy & Brown, 1979). The rationale for nicotine fading is that cigarette smoking is physically addicting for many smokers and that gradually reducing their dependence on nicotine will reduce the intensity of their withdrawal symptoms at quit date, thus making quitting less difficult. However, the experience of nicotine withdrawal symptoms throughout the fading process may serve as the type of exposure to uncomfortable symptoms and sensations that we recommend for early lapsers and discuss below. One drawback of nicotine fading is that smokers may compensate by smoking more cigarettes or changing the topography of their smoking behavior (inhaling more deeply, smoking more of each cigarette, blocking filter holes). Smokers should be cautioned about this possibility and advised to keep such changes to a minimum. Nicotine fading was one part of a standard multicomponent behavioral treatment that demonstrated 1-year biochemically verified abstinence rates of 24.7% in smokers with past MDD, a subpopulation presumed to be at high risk for relapse (Brown, Kahler, Niaura et al., 2001). Thus nicotine fading can serve as an alternative to pharmacotherapy for smokers who desire a nonpharmacological approach or for whom pharmacotherapy is contraindicated. Details regarding the use of nicotine fading can be found elsewhere (Brown, 2003b; Foxy & Brown, 1979).

5.3. Incorporating exposure procedures

Exposure-based procedures are at the core of most effective behavioral treatments for the anxiety disorders (Barlow, 2002). “In vivo exposure involves the systematic, repeated contact with the avoided situation” (White & Barlow, 2002, p. 358). In the treatment of panic attacks, fear reduction via reproduction of and exposure to the interoceptive, somatic sensations of panic have received considerable empirical support and are a key component in Barlow's efficacious, cognitive-behavioral treatment of panic attacks and related anxiety (Barlow et al., 1984; Barlow, Craske, Cerny, & Klosko, 1989).

Early smoking lapse following a cessation attempt can best be conceptualized as avoidance of the distressing, interoceptive sensations associated with nicotine withdrawal by self-administering nicotine (i.e., smoking). As nicotine reaches the brain within 6–8 s 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. A behavioral nicotine dependence treatment that addresses the issue of distress tolerance would have at its core the systematic and repeated exposure to increasingly lengthy periods of smoking abstinence prior to quit date. This could best be accomplished by prescribing specific periods of smoking abstinence during the preparation stage of quitting, prior to quit date. These prescribed periods of abstinence may be of increasing duration over time and would ideally be scheduled to coincide with periods where specific trigger situations would otherwise occur. Different exposure durations and schedules could be imagined. One such schedule might gradually increase the duration with the intent of “building in” success and thus presumably

increasing self-efficacy. A more aggressive schedule might include an experimental, 24-h quit period, with the recognition that failure to achieve the goal, while not ideal, would serve the secondary purpose of providing important information about the factors and associated coping failures that led to the initial lapse which could then be remedied in a subsequent experimental quit attempt. These prescribed periods of smoking abstinence can also be scheduled to coincide with individual and/or group treatment sessions, where discussions can focus on the practice of coping skills used to manage the withdrawal symptoms/internal triggers experienced using the various skills taught during treatment.

Alternatively, a procedure like scheduled reduced smoking serves to produce increasing periods of smoking abstinence, while reducing the stimulus control over trigger situations that would ordinarily accompany smoking (Cinciripini, Wetter, & McClure, 1997). As a treatment strategy unto itself, scheduled reduced smoking has yielded superior cessation outcomes compared to controls (Cinciripini et al., 1995, 1997) and inter-cigarette intervals can be gradually increased for periods up to 4 or 5 h in order to induce nicotine withdrawal and associated discomfort.

To be optimally effective, we believe that smokers also must fully engage in this exposure experience without attempts to use distraction procedures or engage in “control strategies” which promote experiential avoidance. Indeed, it has been demonstrated in the treatment of panic disorder (Craske, Street, & Barlow, 1989) and obsessive-compulsive disorder (Grayson, Foa, & Steketee, 1982) that the use of distraction and related avoidant procedures (distracted exposure) is significantly less effective than a focused exposure approach. However, in the case of exposure to abstinence-induced nicotine withdrawal, prospective quitters will need to demonstrate a willingness to remain in this uncomfortable state and an acceptance of the discomfort and distress involved as they work toward their desired goal of quitting smoking.

5.4. Acceptance and Commitment Therapy

A recent innovation in behavior therapy is the development of theoretical and clinical approaches to experiential acceptance (Jacobson, 1997). Steven Hayes has developed a specific treatment approach, Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999), designed to produce acceptance behaviors aimed at private events that have interfered with accomplishing life goals. Accumulating evidence indicates that ACT is an efficacious treatment approach across a variety of clinical problem areas including cigarette smoking (Gifford, Antonuccio, Kohlenberg, Hayes, & Piasecki, 2002; Gifford et al., 2004), opiate addiction (Hayes et al., in press), depression (Zettle & Hayes, 1986; Zettle & Raines, 1989), psychosis (Bach & Hayes, 2002), stress management (Bond & Bunce, 2000) and social anxiety (Block, 2002).

Unlike more traditional methods of behavior therapy that are predicated on the importance of control, ACT places a central focus on acceptance defined as the behavior of approaching psychologically aversive or troubling internal stimuli while behaving adaptively (Gifford, 1994; Gifford & Hayes, 1997). Indeed, as described by Hayes (2004), “acceptance is not merely tolerance—it is the active nonjudgmental embracing of experience in the here and now. Acceptance involves the undefended ‘exposure’ to thought, feelings, and bodily sensations as they are directly experienced to be” (p. 21).

An overriding goal of an ACT approach is to engender greater psychological flexibility through a series of processes that include defusing thoughts from their literal meanings (e.g., “I need a cigarette”), recognizing that trying to control automatic thoughts, feelings and reactions is part of the problem, identifying important life values (“What do you want your life to stand for?”) and being willing and committed to acting in ways that move oneself toward those life values despite pain and discomfort that might be involved (e.g., without engaging in experiential

avoidance) (Hayes, 2004). This approach may be well-suited to provide early smoking lapsers with the skills needed to persist in their exposure to nicotine withdrawal while remaining fully engaged and non-avoidant of their interoceptive reaction, including physical sensations, thoughts and feelings associated with nicotine withdrawal and quitting smoking. In addition, while the ACT-based, distress tolerance treatment suggested here is geared toward ameliorating early lapse to smoking, this treatment has the potential to promote longer-term maintenance of smoking cessation as well.

The two recently completed studies described below, while not focused specifically on the issue of early lapse, provide support for the application of ACT to smoking cessation. In an initial pilot study, ACT was compared with NRT for 76 nicotine dependent smokers (Gifford et al., 2004). Participants in the ACT condition did not differ from NRT participants on abstinence outcomes at post treatment or 6-month follow-up, but showed significantly better long-term outcomes at 1 year (35% versus 15%), although when missing data were imputed, group differences were nonsignificant. In a larger, randomized controlled trial of 306 participants, ACT in conjunction with bupropion SR was compared to bupropion SR alone (Gifford et al., 2002). The combination ACT/bupropion SR treatment yielded significantly higher quit rates than did treatment with bupropion SR alone. Sixty percent of those in the combination condition were quit at post treatment versus 22% in the comparison condition. Results for the combined condition remained significantly better at 1-year follow-up, with 22% quit in the ACT/bupropion SR condition versus 9% quit in the bupropion alone condition. In both studies, there was evidence that the treatment effects were mediated by changes in levels of avoidance and inflexibility, consistent with the ACT rationale and theory of change.

The results of these initial ACT smoking cessation trials show promise, but it should be noted that neither focused specifically on the treatment of smokers with a history of early smoking lapse or “front-loaded” the ACT skills training components in the pre-quit phase of the cessation treatment. Given that smokers who lapse rarely recover to sustain abstinence and that early lapsers, by definition, have a history of lapsing with hours or a few days of a quit attempt, we believe that the distress tolerance skills training should be heavily front-loaded in the pre-quit period of the treatment. In this way, distress intolerant individuals may be particularly likely to benefit from an ACT-based approach that teaches them to accept and thus tolerate uncomfortable symptoms and sensations while committing themselves to achieving their valued goal of achieving abstinence from smoking.

6. Summary and conclusions

Recent evidence suggests that a significant percentage of individuals attempting smoking cessation lapse to smoking within a matter of days, and that very few of these individuals are able to recover to achieve abstinence from smoking. Current models of relapse devote insufficient attention to this phenomenon of early lapse. Studies attempting to relate *severity* of nicotine withdrawal symptoms to short-term smoking cessation outcomes have yielded equivocal results. We believe that how one *reacts* to the discomfort of nicotine withdrawal and quitting smoking is a more promising avenue of investigation and may have important treatment implications. We propose that inability to tolerate the distress of nicotine withdrawal and associated negative affect is a key factor in early smoking lapse and subsequent relapse. Thus a comprehensive picture of vulnerability to early smoking lapse requires an understanding not only of the important role of negative affect in nicotine withdrawal, but also requires *an examination of individual differences in response to these affective factors*. Emerging evidence regarding the constructs of distress tolerance, anxiety sensitivity and emotional avoidance suggests promising avenues of investigation.

Early smoking lapsers represent a particularly high-risk group of smokers who would benefit from specialized smoking cessation treatment to address their unique needs. To our knowledge, no specialized treatment currently exists to address the specific needs of this unique group of high-risk smokers. We suggest that a distress tolerance treatment for early smoking lapsers would ideally include components of standard smoking cessation treatment, both behavioral and pharmacological, as well as specific treatment elements not traditionally utilized with smokers to address the affective reactivity to distress. These latter elements would include components derived from exposure-based procedures for anxiety-related disorders and from Acceptance and Commitment Therapy.

We expect that the development of a specialized and novel behavioral distress tolerance treatment for early smoking lapsers would add an important new treatment approach for nicotine dependent smokers who have previously had difficulty quitting smoking. The treatment emphasis on reactivity to nicotine withdrawal and the focus on process mechanisms of distress tolerance, anxiety sensitivity and experiential avoidance in individuals with histories of early smoking lapse would represent the type of treatment innovation that has long been called for in the behavioral tobacco dependence field (Shiffman, 1993). Furthermore, the development of a specialized, efficacious treatment for early smoking lapsers, a significant subpopulation of smokers at greatest risk for difficulties quitting, would have important clinical and public health significance in decreasing the overall prevalence of cigarette smoking.

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