Published in final edited form as:
Addict Disord Their Treat. 2010 March 1; 9(1): 41–52. doi:10.1097/ADT.0b013e3181b91c6b.

History of single episode and recurrent major depressive disorder among smokers in cessation treatment: Associations with depressive symptomatology and early cessation failure

Amy M. Cohn, Ph.D.
Center of Alcohol Studies/Rutgers University

David R. Strong, Ph.D., **Ana M. Abrantes, Ph.D.**, and **Richard A. Brown, Ph.D.**
Alpert Medical School of Brown University/Butler Hospital

Abstract

Objectives: Research and theory provide initial support for the potential utility in distinguishing between recurrent and single episode MDD smokers for cessation treatment. However, no study to date has examined differences in clinical presentation at the outset of treatment among these two groups and whether these clinical profiles are indicative of early cessation failure (smoking on quit day).

Methods: In a secondary analysis of a sample of 179 smokers entering cessation treatment, we examined baseline differences in dysfunctional attitudes, maladaptive coping, self-efficacy to manage negative affect, depressive symptoms, depressed mood, and experienced pleasure from life events between smokers with a history of recurrent major depression (MDD-R; 54.7%) and single episode major depression (MDD-S).

Results: Results showed that MDD-R smokers reported lower self-efficacy to cope with negative affect, greater depressive symptoms, and greater depressed mood than MDD-S smokers, although no differences were found on dysfunctional attitudes, avoidance coping, and level of experienced pleasure from daily life events. A greater number of MDD-R compared to MDD-S smokers were not abstinent on their quit day, however a history of recurrent MDD did not increase risk for early cessation failure.

Conclusions: The findings indicate that although depressed mood, negative affect-regulation ability, and depression severity distinguish recurrent and single episode MDD smokers at the start of cessation treatment, these differences do not necessarily portend greater risk for cessation failure in the early stages of treatment.

Keywords

Smoking cessation; Recurrent depression; Self-efficacy; Cognitive-behavioral therapy

Introduction

Depressive disorders are highly prevalent, chronic, and functionally impairing. It is estimated that by the year 2020, major depression will be counted as the number one mental or physical disability in the United States. Depressive disorders are also known to influence significantly

Dr. Cohn was at the Alpert Medical School of Brown University. She can now be reached at the Center of Alcohol Studies, to which all correspondence should be addressed.

the progression and treatment of comorbid medical and psychiatric illnesses.[1] Data show that individuals with current or past MDD comprise a large segment of those who smoke.[2] Large scale epidemiological studies have consistently demonstrated that smokers are at increased risk for experiencing a major depressive episode at some point in their life [3,4] and in a large catchment area survey, depression history was related to greater frequency of regular smoking, and smokers were more likely to report a positive history of depression relative to non-smokers. [5] Among smokers entering cessation treatment, lifetime prevalence rates of MDD range between 18.5% and 60.6%.[6,7,8] Individuals with a psychiatric illness, especially those with a history of MDD have disproportionately higher rates of smoking[9,5] and less success quitting compared to smokers without a history of MDD.[3]

While the comorbidity between MDD and nicotine dependence is high[10, 11] questions remain about the specific mechanisms that link MDD history to smoking.[12,13,14] Specifically, findings from a compilation of cessation studies suggest that, while MDD history may be associated with higher risk for possessing factors associated with poor cessation outcomes,[15] MDD history alone does not consistently predict smoking prevalence or cessation failure.[12,16,17] For example, a positive MDD history as been associated with greater pre-quit dysfunctional attitudes, use of maladaptive coping, and negative mood, as well as increased risk for relapse at four and 10 weeks post-quit.[18] Several meta-analytic reviews and outcome studies have demonstrated a positive relationship between smoking and MDD history or affective vulnerability.[12,16,17] Smokers with a history of MDD are at increased risk for experiencing depressive symptoms post-cessation than those without an MDD history.[19] In contrast however, findings from a large community sample showed no differences between smokers with and without a history of MDD on the likelihood of quitting,[20] while a recent a meta-analysis of 15 smoking cessation outcome studies observed no differences in either three or six month abstinence rates among MDD history-positive versus history-negative smokers.[21] Thus, while inconsistent findings remain regarding effects of MDD history on nicotine dependence and abstinence rates, empirical gaps in the current research warrant continued investigation into mechanisms that account for these differences.

In a recent review on depression, Cassano and Fava[1] call for a “redefinition” of MDD; one that takes into account the chronic as well as recurrent nature of the disorder. Research shows that more than half of those who experience a single episode will continue to have episodes that occur as frequently as once or even twice a year; and having had more than one previous MDE, compared to a single episode, is an even stronger predictor of depression recurrence. [22] Thus, if smoking cessation treatments are to be successful, then it is of immediate importance to examine how and whether the redefinition of depression as a recurrent illness is clinically relevant and meaningful to smoking cessation efforts. However, little is known about the distinct clinical features that differentiate smokers entering treatment with and without recurrent versus single-episode MDD.

There is evidence to suggest that the relationship between MDD and smoking may be explained better by differences that exist between recurrent compared with single-episode depression smokers. Findings from our clinical trial examining the addition of cognitive-behavioral treatment for depression (CBT-D) to standard smoking cessation treatment in 179 smokers with past MDD indicated that smokers with a history of recurrent MDD had significantly higher abstinence rates at follow-up than those with a history of single episode MDD if they received specialized CBT–D treatment.[23] These findings were replicated by Haas et al.24 who found that in pooled data from three studies by Hall and colleagues,6,7,[25,26] smokers with recurrent MDD who received specialized mood management therapy were 2.43 times more likely to remain abstinent 12-months post-quit, than recurrent MDD smokers who had received only the standard cessation treatment. Moreover, Haas et al.[24] found that smokers with a history of recurrent versus single episode depression had higher levels of mood disturbance over the

course of cessation treatment, compared to those with a single past episode of MDD, which appeared to influence abstinence rates at follow-up. Therefore, examining risk and protective factors for smoking cessation that differentiate between recurrent and single episode MDD smokers is warranted. It has not yet been established whether, among smokers seeking cessation treatment, those who have a history of recurrent MDD enter treatment with a profile of psychological risk factors, targeted in CBT-D treatments, which distinguishes them from smokers with a single past MDD episode.

There are several reasons to suggest that smokers with recurrent versus single episode MDD would differ substantially in clinical presentation. According to Beck's cognitive theory of depression,[27] individuals with recurrent MDD are more vulnerable to depressive symptomatology, relative to those who have experienced only a single major depressive episode, due in part, to chronic dysfunctional beliefs and over-learned avoidant coping patterns.[28] Indeed, empirical research provides evidence that, after controlling for age and length of illness, recurrently depressed individuals endorse a greater number of depressive symptoms and greater symptom severity, relative to single episode MDD individuals.[29,30,31] Similarly, evidence in the smoking literature demonstrates that smokers with a history of recurrent MDD incur the greatest risk for experiencing a new major depressive episode following cessation treatment, 32 and show differential rates of abstinence compared to those with single episode MDD.[23] There is also evidence to support that dysfunctional attitudes and maladaptive coping styles are more strongly associated with recurrence of major depressive episodes. Specifically, cognitive vulnerability for depression (e.g., distorted cognitions about the self, world, and others) and a negative attributional style are uniquely and positively associated with recurrence of major depressive episodes,[33] while studies show that an avoidance coping style is associated with greater risk for recurrence of major depressive episodes rather than a single episode of MDD.34 Finally, studies consistently demonstrate that recurrence of major depressive episodes, rather an a single episode alone, is uniquely and significantly associated with lower levels of self-efficacy, after controlling for number of prior episodes and poor psychosocial functioning.35 Extrapolating from these findings, research would suggest that MDD-R and MDD-S smokers exhibit differences in their clinical profile, specifically with respect to degree of depressive symptoms, cognitive distortions, and self-efficacy.

One associated feature of MDD that has been relatively unexplored in relation to smoking cessation is experienced pleasure from life events, which describes one's capacity to derive enjoyment or gratification from daily activities.[36] Experienced pleasure may be a treatment target for depressed smokers because of its role as both a symptom of, and a risk factor for MDD, as well its association with various markers for depression, such as dysfunctional attitudes, negative automatic thoughts, and depressive symptoms.[37] Behavioral activation and pleasant events scheduling are well known and prominently utilized components of cognitive and behavioral treatments for depression, which attempt to increase experienced pleasure among depressed persons who report low levels of response contingent reinforcement.[38] In clinical research and small-scale treatment outcome trials for depression, low levels of experienced pleasure have been linked to greater depressive symptoms,38 depressed mood, 39 and current MDD.40,[41] In addition, there is evidence to suggest that individuals with MDD and concomitantly low levels of experienced pleasure (i.e., anhedonia) endorse greater social impairment, depressive symptoms, and feelings of hopelessness.[42] Despite the associations of experienced pleasure with depressive symptomatology, little is known about differences in experienced between individuals with a history of recurrent compared to single episode MDD, and no research to date has used this marker of depression to identify smokers with and without a history of recurrent MDD.

Taken together, data that have examined differences in depressive symptomatology between individuals with and without recurrent MDD are particularly relevant to the current

investigation, as recent studies have shown that smokers with elevated depressive symptoms report greater dysfunctional attitudes and maladaptive coping strategies before quitting,[43] and that elevated depressive symptoms predict relapse to smoking after a quit attempt.[15,17,44] Thus it seems that depression-relevant risk factors would be more strongly represented and of greater severity among individuals with a history of recurrent MDD, and, by extension, data suggest that adult smokers who enter treatment with a history of recurrent versus single MDD may possess a distinctly different clinical profile that places them at greater risk for poor cessation outcomes. Such "clinical profiling" may increase knowledge of the phenotypic expression of affectively vulnerable smokers, as well as help clarify pathological stages that may lead to smoking among individuals with depression.

In order to identify whether distinct and clinically relevant MDD-smoking subtypes exist between smokers with a history of recurrent and single episode MDD, the purpose of the present study was to examine differences in clinical presentation at baseline of depressive symptomatology among recurrent and single-episode MDD smokers, and to examine whether these factors predict early cessation failure (i.e., smoking on quit day). The current study is a secondary analysis based of previously published treatment outcome data,[23] which found that smokers with a history of recurrent MDD who received specialized cessation treatment that incorporated cognitive-behavioral therapy for depression (CBT-D) had higher abstinence rates across all follow-ups compared to those receiving standard treatment. The aim of this study was to explore whether MDD-R versus MDD-S smokers enrolled in a smoking cessation program differ on depression-relevant variables at baseline and on response to smoking cessation treatment. We hypothesize that (1) smokers with recurrent MDD, compared to those with a history of single episode MDD, would begin cessation treatment with greater dysfunctional attitudes, coping skills deficits, lower experienced pleasure and lower self-efficacy to cope with negative mood-related events, higher levels of negative mood, and greater depressive symptoms, and (2) MDD-R compared to MDD-S smokers would be at greater risk for early cessation failure as evidenced by smoking on their scheduled quit day, and that this effect would occur over and above the variance explained by baseline depressive symptomatology, demographic factors, and smoking severity.

Methods and Materials

Participants

The sample consisted of 179 smokers with a history of MDD, who were recruited from the community to participate in a treatment outcome study that investigated the efficacy of standard smoking cessation treatment plus cognitive-behavioral therapy for depression compared to standard smoking cessation treatment (ST) only. Participants were randomized to either CBT-D or ST and attended eight 2-hr group sessions over 6 weeks.

Individuals were included if they were between the ages of 18 and 70 years, had smoked regularly for at least 1 year, were currently (past 6 months) smoking more than 10 cigarettes per day, and endorsed a history of MDD according to criteria of the Diagnostic and Statistical Manual of Mental Disorders (3rd edition, revised; *DSM-III-R*)[45] as determined by the Structured Clinical Interview for DSM-III-R–Non-Patient Edition (*SCID-NP*).[46] Individuals were excluded from the study if they had the following: (a) *DSM-III-R* diagnosis of current MDD or other Axis I disorder (other than nicotine dependence), (b) *DSM-III-R* diagnosis of current substance abuse or dependence within the past 6 months (other than nicotine), (c) current use of psychotropic medication, (d) current weekly psychotherapy, (e) use of other tobacco products, or (f) intent to use pharmacological aid to cessation.

Of the participants reported in Brown et al.,[23] 59.8% were women (n = 107), 52.5% (n = 94) were married or living with a partner, and 97.2% (n = 174) identified as Caucasian. The mean

age of the sample was 45.1 years (*SD* = 9.3) and the mean number of years of education was 14.4 (*SD* = 2.5). Participants had been smoking for an average of 27.1 years (*SD* = 9.5), smoked an average of 27.3 cigarettes a day (*SD* = 11.3), and reported a mean score on the Fagerstrom Test for Nicotine Dependence (FTND)[47] of 6.4 (*SD* = 1.8). At baseline, saliva cotinine levels averaged 383.7 ng/ml (*SD* = 170.6). The mean score on the Beck Depression Inventory (BDI) [48] at Session 1 was 7.8 (*SD* = 6.3). For number of lifetime episodes of MDD, 98 (54.7%) participants reported a history of recurrent MDD and 79 participants reported single episode MDD.

Procedure

Potential participants were recruited by local radio and newspaper advertisements. Individuals were initially screened by telephone to determine eligibility for the baseline interview. Those who met preliminary criteria were scheduled for an initial assessment interview, at which time they signed a statement of informed consent approved by the Butler Hospital Institutional Review Board. Of the 358 participants who were screened, the 179 eligible participants were randomly assigned to either ST (*n* = 93) or CBT-D (*n* = 86).

Description of Treatment Conditions

Treatments consisted of eight 2-hour sessions over a 6-week period. Quit date (Session 5) occurred 4 weeks after the first treatment session and began upon awakening in the morning. Sessions occurred weekly, except for Session 6, which took place 3 days after quit date. The ST condition included self-monitoring and self-management of cigarette use, nicotine fading, relapse prevention, and enhancement of social support. The CBT-D condition included all components of the ST condition, with the addition of cognitive-behavioral, mood management skills training for coping with depression, which included daily mood monitoring, scheduling pleasant activities, cognitive restructuring, and assertiveness training. Neither condition provided pharmacotherapy. Following treatment completion, follow-up phone interviews occurred at 1, 6, and 12 months to assess for smoking abstinence. For additional information on specific common and distinct elements of ST and CBT-D, please refer to the original outcome paper by Brown et al.,[23] which outlines the treatment conditions in greater detail.

Measures

Demographics—A brief self-report questionnaire given at baseline assessed basic demographic and background information such as age, gender, years of education , current employment, marital status, and household income.

Smoking History—A brief interview-administered questionnaire asked participants about the number of years they had been a regular smoking, average number of cigarettes smoked per day in the past week, onset of regular smoking, number of previous quit attempts, and longest duration of abstinence from smoking.

Severity of Nicotine Dependence—Severity of nicotine dependence was assessed at baseline using the Fagerstrom Test for Nicotine Dependent (FTND).[27] The FTND is a 6-item likert scale self-report questionnaire that demonstrates good psychometric properties and convergent validity.[49,50]

Diagnostic History—Lifetime and current *DSM-III-R* Axis I diagnoses were determined with the *SCID-NP* [46] by trained interviewers during the initial assessment interview. Participants were classified as having past recurrent MDD if they met criteria for two or more distinct lifetime episodes of MDD.

Coping—Coping was assessed using the 39-item Ways of Coping Checklist[51] administered at baeline. This self-report questionnaire measures six dimensions of coping: Problem Focused, Social Support, Self-Blame, Wishful Thinking, Avoidance, and Blamed Others. The Avoidance subscale in the current study demonstrated a Cronbach's alpha of .79.

Depressed Mood—The Depression-Dejection subscale of the Profile of Mood States (POMS)[52] was obtained at baseline to assess current depressed mood (e.g., “How are you feeling right now”). POMS scores were square root transformed to correct for positive skewness. Cronbach's alpha for the current study was .92.

Depressive Symptoms/Depression Severity—The Beck Depression Inventory[48] was used to assess depression severity at baseline. BDI scores were square root transformed to correct for positive skewness. Good test–retest reliability, internal consistency, and convergent, concurrent, and criterion-related validity have been established with the BDI (Beck, Steer, & Garbin, 1988). Cronbach's alpha for the current study was .84.

Dysfunctional Attitudes—The Dysfunctional Attitudes Scale (DAS)[53] is a 40-item self-report questionnaire that assesses self-referential dysfunctional attitudes consistent with Beck's27 cognitive theory of depression. The DAS yields two subscale scores, Need for Approval and Perfectionist, as well as a total score. The total score obtained at baseline was used in the current study. The DAS has demonstrated good psychometric properties in previous studies54 and Cronbach's alpha for the current study was .78.

Self-Efficacy—A short version of the Smoking Abstinence Self-Efficacy scale (SASE)[55] was used at baseline to assess level of confidence to refrain from smoking in nine challenging situations, and is divided into three subscales associated with self-efficacy to cope with negative affect, positive affect, and habit associated with smoking. High scores indicate high levels of efficacy for abstinence. The negative affect subscale was used for analyses in the current study, with a Cronbach alpha of .85.

Experienced Pleasure—The Pleasant Events Schedule-Mood Related (MR) Form[36] is a 49-item self-report inventory used to assess the frequency and enjoyability of various daily activities in the month prior to baseline. Items are rated 0 if the event “has not happened,” 1 if the activity occurred “1 to 6 times,” or 2 if the event occurred “7 or more times.” If the individual has not engaged in the activity in this time period, they are asked to rate how enjoyable it “would have been.” Each item yields a frequency score and an enjoyability score (subjective pleasure rating), and these two scores are multiplied to create an index of Experienced Pleasure. A higher cross-product score indicates that the activity was engaged in with a higher amount of reinforcement potential. The MR form of the PES has been used widely to assess frequency and pleasure of engagement in depressed populations and has been able to reliability discriminant between depressed and non-depressed individuals36. Cronbach's alpha for the experienced pleasure subscale in the current study was .94.

Smoking Status—Self-reports of smoking status were collected at quit date. Participants' reports of abstinence were verified biochemically with alveolar carbon monoxide (CO) ≤10 using a CMD/CO Carbon Monoxide Monitor (Model 3110; Spirometrics, Inc., Auburn, ME), which detects carboxyhaemoglobin level. In those few cases where biochemical verification could not be obtained (5%) self-reported abstinence was verified through interviews with significant others.

Data Analytic Plan

As a first step of data analysis, we examined differences between smokers with a history of recurrent MDD (MDD-R) and single episode MDD (MDD-S) on demographic factors (age, gender, years of education, total household income) to determine potential covariates for analyses discussed below. In the second step of data analysis, we examined correlations among smoking characteristics (number of cigarettes smoked per day, age of onset of regular smoking, level of nicotine dependence, number of previous quit attempts) and depressive symptomatology variables (depressed mood, depression severity, dysfunctional attitudes, avoidance coping, negative affect self-efficacy, and experienced pleasure) separately for MDD-R and single MDD-S smokers. As a third step of our data analytic plan, to control for Type I error and potential statistical overlap among dependent variables, we conducted a Multivariate Analysis of Variance test (MANOVA) to examine differences between MDD-R and MDD-S smokers on four smoking characteristics at baseline as the dependent variables: severity of nicotine dependence, number of cigarettes smoked per day, number of previous quit attempts, and number of years regular smoking.

To test hypothesis 1, we used a MANOVA test to examine differences between MDD-R and MDD-S smokers on six characteristics of baseline depressive symptomatology: dysfunctional attitudes, depressed mood, depression severity, avoidance coping, negative affect self-efficacy, and experienced pleasure. To test hypothesis 2, we examined differences in the distribution of abstainers and smokers on quit day between MDD-R and MDD-S smokers using a chi-square test. Then, we used logistic regression to examine whether history of MDD-R predicts risk for early cessation failure (smoking on quit day), over and above the effects of baseline depressive symptomatology and treatment condition. As our dependent variable, we dichotomized smoking on quit day (0 = no, 1 = yes) as the outcome variable, and entered depressive symptomatology and age of onset of first major depressive episode into the first step of the model, treatment condition in the second step, and depression history in the third step.

Results

Associations among depression history and demographic variables

As assessed by the SCIP-NP Version 1.0,[46] all participants in the study reported a history of MDD, while 54.7% (n = 98) had a history of recurrent MDD. Participants with a history of recurrent MDD reported an average of 4.52 major depressive episodes (SD = 6.08, range = 2 – 99) and had an earlier average age of onset of their first major depressive episode [$F(1, 172) = 60.16$, $p < .01$] compared to those with single episode depression (M = 24.35, SD = 11.39 for recurrent episode and M = 37.4, SD = 10.62 for single episode). Univariate associations revealed no other significant differences between those with recurrent or single episode MDD with respect to age, years of education, total household income, and gender.

Smoking Characteristics

A Multivariate ANOVA test revealed no significant differences (missing data for 3 people) between recurrent and single-episode MDD smokers on level of nicotine dependence, number of cigarettes smoked per day, number of previous quit attempts, and age of onset of daily smoking, Wilks' lamda = .98, $F(4, 172) = .93$, $p > .05$.

Depressive Symptomatology

To correct for positive skewness, POMS and BDI scores were square-root transformed. Means, standard deviations, and Pearson product-moment correlation coefficients among variables of depressive symptomatology between MDD-R and MDD-S are presented in Table 1. A Fischer's r to z transformation revealed that the association between experienced pleasure and baseline

BDI was significantly stronger among MDD-S than MDD-R smokers ($z = 2.54$, $p < .01$), indicating that, among MDD-S smokers, as depressive symptoms increase, experienced pleasure from life events decreased at a much quicker rate than among MDD-R smokers.

A MANOVA test indicated that MDD-R versus MDD-S smokers differed significantly on baseline depressive symptomatology, [Wilks' lambda = .92, $F(6, 153) = 2.12$, $p < .05$]. Missing data occurred for 19 cases, due in part to missing responses from the Ways of Coping Checklist that was administered at Session 2. Follow-up Univariate tests revealed that MDD-R smokers reported significantly higher levels of BDI depressive symptoms [$F(1, 159) = 6.49$, $p < .01$; $M = 8.76$, $SD = 6.65$) than MDD-S smokers ($M = 6.31$, $SD = 5.29$), endorsed higher levels of baseline depressed mood [$F(1, 159) = 5.37$, $p < .05$] than those with single episode MDD ($M = .51$, $SD = .42$ for recurrent and $M = .36$, $SD = .38$ for single), as significantly lower baseline self-efficacy to cope with negative affect [$F(1, 159) = 5.14$, $p < .05$] than smokers with single episode MDD ($M = 1.67$, $SD = .71$ for recurrent and $M = 1.95$, $SD = .81$ for single). No significant differences between MDD-R and MDD-S smokers were found for indices of dysfunctional attitudes, experienced pleasure, or avoidance coping. See Table 2 for multivariate and univariate tests between MDD-R and MDD-S smokers for depressive symptomatology.

Associations of Recurrent and Single Episode MDD with Abstinence on Quit Day

A Pearson Chi-Square analysis (missing data for 2 cases) revealed a significant difference in the distribution of smoking between MDD-R and MDD-S smokers on quit day, χ^2 (N=177) 4.44, $p < .05$. Specifically, 65% of individuals who smoked on their quit day had a history of recurrent MDD, compared to only 35% of individuals with a history of single episode MDD. See Table 3 for distribution of abstinence rates between recurrent and single episode MDD smokers on quit day.

Binary stepwise logistic regression was conducted to examine whether a history of MDD-R increased odds for early cessation failure. Entered in the first block of the model were variables of depressive symptomatology that were significantly associated with MDD-R (i.e., depression symptom-severity, depressed mood, and negative affect self-efficacy), as well as treatment condition. Entered in the second step of the model was MDD-R (0 = single episode and 1 = recurrent episode). Results revealed that MDD-R did not increase risk for early cessation failure compared to MDD-S, $\beta = .45$, $p > .05$. No other variables in the model significantly predicted risk for smoking on quit day.

Discussion

Results from this study provide partial support for the stated hypotheses and extend the work of Brown et al.[23] by examining ways in which recurrent MDD smokers differ from those with single episode MDD on relevant risk factors for smoking cessation relapse. First, as hypothesized, findings showed that, among smokers seeking cessation treatment, a history of recurrent MDD was associated with greater severity of depressive symptomatology when entering cessation treatment. Specifically recurrent MDD smokers reported higher levels of pre-quit depressed mood, depressive symptoms, and lowered self-efficacy to cope with negative affect-related events, relative to smokers with single episode MDD. Moreover, results showed that nearly twice as many smokers with a history of recurrent depression were smoking on their quit day, relative to smokers with a history of single episode MDD. Logistic regression revealed the odds of smoking on quit day were not increased among individuals with recurrent MDD after taking into account baseline depressive symptomatology and treatment condition. One explanation for this finding could be that increases in depressed mood and depressive symptoms immediately before or during quit day made it more difficult for MDD-R smokers to abstain from smoking following nicotine withdrawal. Indeed, some studies have shown that

a pattern of rapidly increasing depressive symptoms on and after quit date is associated with cessation failure among smokers with a history of recurrent depression.[15] These findings suggest, however, that there exist characteristics unique to recurrent MDD smokers that could be clinically valid and relevant in terms of treatment matching and success at continued abstinence.

Counter to expectations, there were no significant differences between MDD-R and MDD-S smokers on several aspects of depressive symptomatology: experienced pleasure from daily life events, dysfunctional attitudes, and avoidance coping. These findings are inconsistent with previous research and theory in the depression literature, which have demonstrated that individuals with recurrent depression endorse greater dysfunctional attitudes and are more apt to use avoidance coping strategies compared to depressed peers who had experienced only one major depressive episode. We also found, smokers with a history of recurrent compared to single episode MDD did not differ significantly in terms of number of cigarettes smoked per day, number of years smoking, level of nicotine dependence, and number of previous quit attempts. While these results were not consistent with our expectations, they are similar to findings from other studies that have examined differences between smokers with recurrent and single episode MDD on various smoking characteristics. For example, Johnson and Breslau[20] reported no differences in the rate of current smoking between smokers with recurrent or single episode MDD. Finally, contrary to our hypothesis, a history of recurrent depression did not predict increased risk for early cessation failure (smoking on quit day), nor did other baseline symptoms of depression.

Results of this study are, to some extent, consistent with cognitive theories of depression,[27] which state that individuals with MDD experience concomitantly low self-efficacy to cope with difficult life events, due in part to chronic depressed mood as well as irrational beliefs sets about the self, world, and others.[27] The findings regarding self-efficacy are similar to previous studies demonstrating that poor self-efficacy mediates the association between pre-quit depressive symptoms and poor abstinence outcome.[56] In addition, although depression recurrence did not predict cessation failure in the early stages of treatment, that smokers with a history of recurrent depression had greater depressive symptoms and depressed mood, compared to smokers with single episode MDD, could have implications for cessation failure in the later stages of treatment. Indeed, findings from the primary outcome study conducted on this sample, reported by Brown et al.[23]did show that smokers with recurrent versus single episode MDD evinced significantly different abstinence rates up to a year post-treatment. In addition, we did not find that dysfunctional attitudes and avoidant coping were overly represented among smokers with a history of recurrent rather than single MDD in our sample. Previous studies that have documented associations of smoking with dysfunctional attitudes and avoidance coping have focused on comparisons between smokers with and without a history of MDD,[43] and not specifically examined MDD-R versus MDD-S smokers. Finally, while experienced pleasure did not emerge as a significant marker for recurrent MDD in this sample, the significant correlations with other known cessation risk factors in depressed smokers warrants examination in future studies. Overall, differences between MDD-R and MDD-S smokers on some factors of depressive symptomatology indicate that smokers with a history of depression do not uniformly share common risk factors and symptom profiles.

There were several drawbacks of the present study that warrant further consideration. First, we did not examine a sample of currently depressed smokers for clinical and ethical reasons, nor did we assess the timing of the last depressive episode in relationship to study enrollment. Exclusion of currently depressed smokers may have reduced our power to find significant group differences, due in part to the fact that smokers were not currently distressed at the time of treatment and similarly. Potential effects due to the exclusion of currently depressed smokers, as well as recency of depressive episodes on current findings are far from clear.

However, it should be noted that Shih and Eberhart[57] found that prior depression can impact an individual well after the depressive episode has ended, thus suggesting past depression can be a useful proxy for measuring current symptomatology. Second, the findings are somewhat limited because a group of smokers without a history of MDD was not included. This may explain why some of the hypothesized differences were not detected in the current study. Third, the causative direction of the associations among recurrent and single episode depression, depressive symptoms, depressed mood, and self-efficacy cannot be established. It may be that poor self-efficacy to cope with negative mood states pre-dispose recurrent MDD smokers to develop depression, while it may also be that, as a result of chronic and recurring major depressive episodes, smokers with a history of recurrent MDD, relative to single episode MDD, develop poor coping strategies and pervasive negative mood. Also, while recurrent MDD smokers evinced greater pre-cessation depressed mood, depressive symptoms, and self-efficacy compared to single episode smokers, it should be noted the effect size of these associations were small.

This study adds to the literature in several ways and has potential clinical implications. With regards to risk and protective factors associated with smoking cessation, to date, little research has examined variations in specific DSM-based clinical features among smokers entering cessation treatment with either recurrent or single episode MDD, nor have studies attempted to examine whether depression recurrence predicts early cessation failure among smokers in cessation treatment. In addition, while some differences in clinical presentation were found between smokers with single versus recurrent MDD, the study did not find any differences with respect to early cessation outcome, after adjustment for treatment condition and other factors. However, differences between MDD-R and MDD-S smokers were found in the primary outcome study reporting on this sample,[23] in which smokers with recurrent MDD who received CBT-D evinced better cessation outcomes at 12-months follow-up, compared to those with single episode MDD who received CBT-D. These findings support the rationale for using CBT-D for smokers with recurrent MDD, but suggest that modifications to the content and format of mood management interventions should be made to increase early cessation treatment success. Other mediating or moderating mechanisms that were not explored in the current study may explain better the association between MDD-R, depressive symptomatology, and the potential for early cessation failure. Indeed, future studies warrant replication of the findings in the current study using a clinically distressed sample of smokers to determine the impact of depressive symptomatology and depression history on successful abstinence. Finally, given its association with other known risk factors of depressive symptomatology, future studies are needed to provide more information on how experienced pleasure from daily life events and MDD recurrence among smokers contribute to smoking relapse during a quit attempt.

Acknowledgments

We would like to thank Dr. Elizabeth Epstein and Dr. Brett Hagman for their feedback and comments in writing this manuscript.

This study was supported in part by grant No. R01 DA08511 from the National Institute on Drug Abuse to Dr. Richard Brown.

References

1. Cassano P, Fava M. Depression and public health: An overview. J Psychosom Res 2002;53:849–857. [PubMed: 12377293]
2. Lasser K, Boyd JW, Woolhandler S, et al. Smoking and mental illness: A population-based prevalence study. J Am Med Assoc 2000;284:2606–2610.

3. Grant BF, Hasin DS, Chou SP, et al. Nicotine dependence and psychiatric disorders in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry 2004;61:1107–1115. [PubMed: 15520358]
4. Hughes JR. Depression during tobacco abstinence. Nicotine Tob Res 2007;9:443–446. [PubMed: 17454698]
5. Glassman AH, Helzer JE, Covey LS, et al. Smoking, smoking cessation, and major depression. J Am Med Assoc 1990;264:1546–1549.
6. Hall SM, Muñoz RF, Reus VI. Cognitive-behavioral intervention increases abstinence rates for depressive-history smokers. J Consul Clin Psychol 1994;62:141–146.
7. Hall SM, Reus VI, Munoz RE, et al. Nortriptyline and cognitive-behavioral therapy in the treatment of cigarette smoking. Arh Gen Psychiatry 1998;55:683–690.
8. Tsoh JY, Humfleet GL, Muñoz RF, et al. Development of major depression after treatment for smoking cessation. Am J Psychiatry 2000;157:368–374. [PubMed: 10698811]
9. Agrawal A, Lynskey MT. Tobacco and cannabis co-occurrence: Does route of administration matter? Drug Alcohol Depend 2009;99:240–247. [PubMed: 18926646]
10. Breslau N, Kilbey MM, Andreski P. Nicotine dependence, major depression and anxiety in young adults. Arch Gen Psych 1991;48:1069–1074.
11. Glassman AI. Cigarette smoking: implications for psychiatric illness. Am J Psychiatry 1993;150:546–553. [PubMed: 8465868]
12. Covey LS. Comments on “History of depression and smoking cessation outcome: a meta-analysis“. Nic Tob Res 2004;6:743–745.
13. Covey LS, Bomback A, Yan GWY. History of depression and smoking cessation: A rejoinder. Nic Tob Res 2006;8:315–319.
14. Hall SM. ‘History of depression and smoking cessation outcome: A meta-analysis’: The Covey-Hitsman exchange. Nic Tob Res 2004;6:751–752.
15. Burgess E, Brown RA, Kahler CW, et al. Patterns of change in depressive symptoms during smoking cessation: Who's at risk for relapse? J Consult Clin Psychol 2002;2:356–361. [PubMed: 11952193]
16. Covey LS, Glassman AH, Stetner F. Cigarette smoking and major depression. J Addict Behav 1998;17:35–46.
17. Kahler CW, Brown RA, Ramsey SE, et al. Negative mood, depressive symptoms, and major depression after smoking cessation treatment in smokers with a history of major depressive disorder. J Abnorm Psychol 2002;111:670–675. [PubMed: 12428781]
18. Glassman AH, Stetner F, Walsh BT, et al. Heavy smokers, smoking cessation, and clonidine. J Am Med Assoc 1988;259:2863–2866.
19. Niaura R, Britt DM, Borrelli B, et al. History and symptoms of depression among smokers during a self-initiated quit attempt. Nic Tob Res 1999;1:251–257.
20. Johnson EO, Breslau N. Is the association of smoking and depression a recent phenomenon? Nicotine and Tobacco Research 2006;8:257–262. [PubMed: 16766418]
21. Hitsman B, Borelli N, McChargue DE, et al. History of depression and smoking cessation outome: A meta-analysis. J Consul Clin Psychol 2003;71:657–663.
22. Kupfer DJ. Long-term treatment of depression. J Clin Psychiatry 1991;52:28–34. [PubMed: 1903134]
23. Brown RA, Kahler CW, Niaura R, et al. Cognitive-behavioral treatment for depression in smoking cessation. J Consult Clin Psychol 2001;69:471–480. [PubMed: 11495176]
24. Haas AL, Munoz RF, Humfleet GL, et al. Influences of mood, depression history, and treatment modality on outcomes in smoking cessation. J Consult Clin Psychol 2004;72:563–570. [PubMed: 15301640]
25. Hall SM, Muñoz RF, Reus VI, et al. Nicotine, negative affect, and depression. J Consul Clin Psychol 1993;61:761–767.
26. Hall SM, Sees KL, Muñoz RE, et al. Mood management and nicotine gum in smoking treatment: A therapeutic contact and placebo-controlled study. J Consul Clin Psychol 1996;64:1003–1009.
27. Beck, AT. Cognitive therapy and the emotional disorders. International Universities Press; New York: 1976.

28. Rohde P, Lewinsohn PM, Tilson M, et al. Dimensionality of coping and its relation to depression. J Pers Soc Psychol 1990;58:499–511. [PubMed: 2324939]
29. Hollon SD, Shelton RC, Wisniewski S, et al. Presenting characteristics of depressed outpatients as a function of recurrence: Preliminary findings from the STAR*D clinical trial. J Psychiatr Res 2006;40:59–69. [PubMed: 16243357]
30. O'Leary D, Costello F, Gormley N, et al. Remission onset and relapse in depression: An 18-month prospective study of course for 100 first admission patients. J Affect Disord 2000;57:159–171. [PubMed: 10708827]
31. Ramana R, Paykel ES, Cooper Z, et al. Remission and relapse in major depression: A two-year prospective follow-up study. Psychol Med 1995;25:1161–1170. [PubMed: 8637946]
32. Covey LS, Glassman AH, Stetner F. Major depression following smoking cessation. Am J Psychiatry 1997;154:263–265. [PubMed: 9016279]
33. Alloy LB, Abramson LY, Whitehouse WG, et al. Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression. J Abnorm Psychol 2006;115:145–156. [PubMed: 16492105]
34. Bockting CL, Spinhoven P, Koeter MW, et al. Differential Predictors of Response to Preventive Cognitive Therapy in Recurrent Depression: A 2-Year Prospective Study. Psychother Psychosom 2006;75:229–236. [PubMed: 16785772]
35. Gopinath S, Katon WJ, Russo P, et al. Clinical factors associated with relapse in primary care patients with chronic or recurrent depression. J Affect Disord 2007;101:57–63. [PubMed: 17156852]
36. MacPhillamy DJ, Lewinsohn PM. Unpublished Manual for the Pleasant Events Schedule. 1976
37. Cuijpers P, Van Straten A, Warmerdam L. Behavioral activation treatments of depression: A meta-analysis. Clin Psychol Rev 2007;27:318–326. [PubMed: 17184887]
38. MacPhillamy DJ, Lewinsohn PM. The pleasant events schedule: Studies on reliability, validity, and scale intercorrelation. J Consul Clin Psychol 1982;50:363–380.
39. Lewinsohn PM, Amenson CS. Some relations between pleasant and unpleasant mood-related events and depression. J Abnorm Psychol 1978;87:644–654. [PubMed: 739087]
40. Hopko DR, Lejuez CW, Ruggiero KJ, et al. Contemporary behavioral activation treatments for depression: Procedures, principles, and progress. Clin Psychol Rev 2003;23:699–717. [PubMed: 12971906]
41. Wierzbicki M, Frexford L. Cognitive and behavioral correlates of depression in clinical and nonclinical populations. J Clin Psychol 1989;45:872–877. [PubMed: 2613896]
42. Kanter JW, Mullik PS, Busch AM, et al. The Behavioral Activation for Depression Scale (BADS): Psychometric Properties and Factor Structure. J Psychopathol Beh Assess 2007;29:191–2002.
43. Kahler CW, Brown RA, Strong DR, et al. History of major depressive disorder among smokers in cessation treatment: Associations with dysfunctional attitudes and coping. Addict Behav 2003;28:1033–1047. [PubMed: 12834649]
44. Berlin I, Covey LS. Pre-cessation depressive mood predicts failure to quit smoking: The role of coping and personality traits. Addiction 2006;101:1814–1821. [PubMed: 17156181]
45. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Third Edition. APA; Washington, D.C.: 1987. Revised
46. Spitzer, RL.; Williams, JBW.; Gibbon, M., et al. User's guide for the structured clinical interview for DSM-III-R: SCID. American Psychiatric Association; Washington, DC: 1990.
47. Heatherton TF, Kozlowski LT, Frecker RC, et al. The Fagerstrom Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire. Br J Addict 1991;86:1119–1127. [PubMed: 1932883]
48. Beck AT, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clin Psychol Review 1988;8:77–100.
49. Storr CL, Reboussin BA, Anthony JC. The Fagerström test for nicotine dependence: A comparison of standard scoring and latent class analysis approaches. Drug Alcohol Depend 2005;80:241–250. [PubMed: 15908142]
50. Radzius A, Gallo JJ, Epstein DH, et al. A factor analysis of the Fagerström Test fot Nicotine Dependence (FTND). Nicotine & Tobacco Research 2003;5:255–260. [PubMed: 12745499]

51. Folkman S, Lazarus RS. An analysis of coping in a middle-aged community sample. J Health Soc Beh 1980;21:219–239.

52. McNair, DM.; Lorr, M.; Droppleman, LF. Manual for the Profile of Mood States. Educational and Instructional Testing Service; San Diego, CA: 1981.

53. Weissman AN, Beck AT. Development and validation of the Dysfunctional Attitude Scale: A preliminary investigation. Paper presented at the meeting of the Association for the Advancement of Behavior Therapy.

54. Dozois DJ, Covin R, Brinker JK. Normative data on cognitive measures of depression. J Consul Clin Psychol 2003;71:71–80.

55. DiClemente CC, Prochaska JO, Gibertini M. Self-efficacy and the stages of self-change of smoking. Cognit Ther Res 1985;9:181–200.

56. Cinciripini PM, Wetter DW, Fouladi RT, et al. The effects of depressed mood on smoking cessation: mediation by postcessation self-efficacy. J Consult and Clin Psych 2003;71:292–301.

57. Shih JH, Eberhart NK. Understanding the impact of prior depression on stress generations: Examining the roles of current depressive symptoms and interpersonal behaviours. Br J Psychol 2008;99:413–426. [PubMed: 17908367]

Addict Disord Their Treat. Author manuscript; available in PMC 2011 March 1.

Table 1

Means, standard deviations, and Inter-correlations among pertinent variables between smokers with single (N = 79) and recurrent (N = 98) MDD

Single Episode MDD

Measure	**M**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**
1. BDI Depressive Symptoms	6.31[b]	5.29[b]	--	.45**	.49**	.12	−.56** [a]	−.24*
2. POMS Depressed Mood	8.76[b]	6.65[b]		--	.34**	.07	−.37**	−.19†
3. DAS	103.55	26.38			--	.21†	−.56**	−.08
4. Avoidance Coping	2.13	0.71				--	−.11	−.19
5. Experienced Pleasure	2.32	0.64					--	−.13
6. Self-Efficacy	1.95	0.83						--

Recurrent Episode MDD

Measure	M	SD	1	2	3	4	5	6
1. BDI Depressive Symptoms	8.76[b]	6.65[b]	--	.50**	.41**	.28**	−.25* [a]	−.02
2. POMS Depressed Mood	0.27[b]	0.45[b]		--	.38**	.22*	−.36**	−.01
3. DAS	105.77	29.02			--	.31**	−.37**	−.15
4. Avoidance Coping	2.21	0.73				--	−.32**	−.19†
5. Experienced Pleasure	2.17	0.64					--	.05
6. Self-efficacy	1.67	0.73						--

BDI = Beck Depression Inventory; POMS = Profile of Mood States; DAS = Dysfunctional Attitudes Scale;

* $p < .05$;

** $p < .01$;

† marginally significant

[a] = significantly different between recurrent and single episode MDD at $p < .01$

[b] = These scores reflect untransformed data.

Table 2

Multivariate and Univariate Analyses of Variance for Depressive Symptomatology

		Univariate					
	MANOVA	BDI[a]	POMS[a]	Coping	DAS	PES	Self-Efficacy
Variable	*F*(6, 153)	*F*(1, 158)	*F*(1, 158)	*F*(1, 158)	*F*(1, 158)	*F*(1, 158)	*F*(1, 158)
Recurrent MDD	2.12*	5.37*	6.50**	5.14*	2.08	0.52	0.27

Note. *F* ratios were generated from Wilks' lamba. MANOVA = multivariate analysis of variance; BDI = Beck Depression Inventory; POMS = Profile of Mood States; DAS = Dysfunctional Attitudes Scale; PES = Pleasant Event Schedule

[a] = These scores reflect untransformed data.

* $p < .05$.

** $p < .01$

Addict Disord Their Treat. Author manuscript; available in PMC 2011 March 1.

Table 3

Distribution of Abstinence Rates on Quit Day Between Smokers with a History of Recurrent and Single Episode MDD*

	Smoking Status	
Depression History	**% Smokers (N = 69)**	**% Abstainers (N = 108)**
Single Episode	35% (24/69)	51% (55/108)
Recurrent Episode	65% (45/69)	49% (53/108)

* Pearson χ^2 (1, N = 177) = 4.44, p = .03