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Brian Hitsman
Centers for Behavioral and Preventive Medicine, Brown Medical School/The Miriam Hospital

Belinda Borrelli
Centers for Behavioral and Preventive Medicine, Brown Medical School/The Miriam Hospital

Dennis E. McChargue
University of Nebraska-Lincoln, dmcchargue2@unl.edu

Bonnie Spring
University of Illinois at Chicago/Hines Veterans Affairs Hospital, Maywood, Illinois

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Brian Hitsman and Belinda Borrelli
Centers for Behavioral and Preventive Medicine, Brown
Medical School/The Miriam Hospital

Dennis E. McChargue and Bonnie Spring
University of Illinois at Chicago/Hines Veterans Affairs
Hospital, Maywood, Illinois

Raymond Niaura
Centers for Behavioral and Preventive Medicine, Brown Medical School/The Miriam Hospital

The authors conducted a meta-analysis of published studies to (a) evaluate the premise that a history of major depression is associated with failure to quit smoking and (b) identify factors that moderate the relationship between history of depression and cessation outcome. Fifteen studies met the selection requirements and were coded for various study methodology and treatment characteristics. DSTAT was used to calculate individual study effect sizes, determine the mean effect size across studies, and test for moderator effects. No differences in either short-term (≤ 3 months) or long-term abstinence rates (≥ 6 months) were observed between smokers positive versus negative for history of depression. Lifetime history of major depression does not appear to be an independent risk factor for cessation failure in smoking cessation treatment.

A widespread theory, expressed as the "hardening hypothesis," is that the current population of smokers has become increasingly refractory to quitting (Hughes, 1996; Irvin & Brandon, 2000). The inference is that those who continue to smoke despite strong social pressures to quit possess attributes that make it especially difficult to stop smoking. One such factor may be a history of major depression. The hypothesis that a history of depression constitutes

an impediment to smoking cessation emerged in the late 1980s. Glassman et al. (1988) first offered that interpretation after observing that 57% of smokers who lacked a history of depression remained abstinent after 4 weeks of treatment, as compared with 33% of those who were history positive. Subsequent studies by Glassman and colleagues showed that the negative effect of depression on quitting persisted even after the influence of other psychiatric comorbidities had been controlled (Glassman et al., 1990). Moreover, abstinence rates were lower among female smokers with recurrent episodes of depression (5%), as compared with those with single episodes (35%) (Covey, Glassman, Stetner, & Becker, 1993).

The belief that a history of depression greatly decreases the likelihood of quitting smoking has been widely promoted (Anda et al., 1990; Glassman, 1993; Glassman, Covey, Stetner, & Rivelli, 2001; Kinnunen, Henning, & Nordstrom, 1999). The strength of this conviction is illustrated by the extent to which attention has turned to identifying the mechanisms by which a history of depression interferes with achieving abstinence. Hypothesized mechanisms include heightened pretreatment dysphoria (Covey, Glassman, & Stetner, 1990), heightened dysphoria following a quit attempt (Ginsberg, Hall, Reus, & Muñoz, 1995), or recurrence of depression prompted by acute abstinence (Borrelli et al., 1996; Glassman et al., 2001). An additional process hypothesized to increase risk of relapse is the tendency of depression-vulnerable smokers to smoke during dysphoric states (Lerman et al., 1996).

Although it is generally assumed that a history of depression is a barrier to quitting smoking, contradictory evidence also exists (Ginsberg et al., 1995; Hall et al., 1996; Killen et al., 2000; Niaura et al., 1999). We conducted a meta-analysis of the published literature in an attempt to reconcile the conflicting findings concerning the influence of a depression history on smoking cessation. Our primary aim was to evaluate the premise that history of depression is associated with difficulty quitting. We hypothesized that smokers positive for a history of depression would show

significantly lower abstinence rates than smokers negative for a history of depression. A secondary aim was to test whether gender, study methodology, or treatment factors moderated the association between history of depression and smoking cessation.

Method

Literature Search

We conducted the computerized literature review using Medline (1966–2000) and PsycLIT (1971–2000) databases. Two separate searches were performed within each database. We first searched using the keywords *depression* and *smoking*. In our second search, we used the keywords *mood* and *smoking*. In addition, we conducted a manual search of journals most likely to have published original articles on depression and smoking cessation. We restricted the manual search to articles published in the following journals in the year 2000: *Journal of Consulting and Clinical Psychology*, *Archives of General Psychiatry*, *American Journal of Psychiatry*, *Addiction*, *Addictive Behaviors*, *Experimental and Clinical Psychopharmacology*, *Journal of Substance Abuse*, and *Health Psychology*. As a final step, we wrote 26 investigators requesting in press studies on depression and quitting smoking. Individuals were selected from the membership of the Society for Research on Nicotine and Tobacco (2000) on the basis of their having conducted prior research on mood and smoking.

Selection Requirements

Articles identified through our literature search ($n = 1,301$), including the one in-press study received in response to our letter, were evaluated further to determine whether they met our inclusion criteria. To be selected, studies were required to have (a) a valid assessment of history of depression (i.e., no single-item assessments) *and* (b) a measure of smoking cessation outcome. They also were required to be written in English. Because our focus was on smokers' ability to achieve abstinence, we excluded studies in which outcome was defined as smoking reduction or lapse and studies involving retrospective recall of quitting. In addition, case studies were excluded because an effect size cannot be derived from single-subject designs.

Fifteen of 18 studies identified were included in our meta-analysis. Three met our exclusion criteria. Two studies by Cornelius and colleagues (Cornelius et al., 1997; Cornelius, Perkins, Salloum, Thase, & Moss, 1999) were excluded because outcome was defined as smoking reduction. A study conducted by Glassman et al. (1990) was excluded because outcome was based on retrospective recall of smoking cessation.

Ratings of Study Characteristics

We developed a coding scheme that would allow us to describe the sample of studies in our database as well as to examine in secondary analyses study characteristics that might help to account for potential moderating effects of depression on smoking cessation. In addition to the type of depression assessment (questionnaire, semistructured interview, or structured interview), studies were rated on three categories of characteristics. The first was methodology, and included nature of sampling, sample composition, and study design. Nature of sampling was rated as either clinical (treatment sample), epidemiologic (community random sample), or sample of convenience (random sample of intact community). Sample composition was coded as healthy (no current medical or psychiatric illness), medical (unstable medical condition, such as recent myocardial infarct), psychiatric (current psychiatric condition, such as alcohol dependence), or mixed (participants with concurrent medical and major psychiatric illness). Design was rated as either cross-sectional or prospective.

We coded for two treatment characteristics: modality and intensity. Modality was rated as unaided (minimal or no intervention), behavioral therapy, pharmacotherapy, or combined behavioral therapy and pharmacotherapy. Intensity was rated as either minimal (≤ 3 hr total patient–

therapist contact) or intensive (> 3 hr total contact). The third category was smoking status, where we coded for its definition and how and when it was assessed. Definition of smoking status was coded as point-prevalent (abstinence at a single time point), continuous (abstinence between initial quitting and a follow-up time point), or prolonged (sustained abstinence between two follow-ups). The type of smoking status assessment was coded as self-report or self-report with biochemical verification. Smoking cessation outcome was rated as either short- (≤ 3 months) or long-term (≥ 6 months). Classification for the definition of smoking status and smoking cessation outcome was based on recommendations made by the Society for Research on Nicotine and Tobacco Subcommittee on Abstinence Measures (Hughes et al., 2003).

Studies were coded independently by two reviewers. When there was disagreement, consensus was reached through a third reviewer. Across studies and characteristics, there was excellent agreement between raters (84.6%). The methodological and treatment characteristics of the studies in the meta-analysis are displayed in the Appendix.

Procedure

Our analytic procedure consisted of five steps and was based on the procedures recommended by Hedges and Olkin (1985). First, we computed the effect size, Hedges's g, for each of the identified studies. Because it was plausible that the effect of depression on smoking cessation might vary as a function of length of outcome, we attempted whenever possible to obtain separate effect sizes for both short- and long-term cessation. Effect sizes were calculated using the meta-analytic program DSTAT and the following equation (Johnson, 1989).

$$g = (P_E - P_C)/S_{pooled}$$

P_E represents the proportion abstinent for the history positives, P_C represents the proportion abstinent for history negatives, and S_{pooled} represents the pooled standard deviation between the two groups. Data for this computation were available in 12 of 15 studies. For 2 of the 3 remaining studies (Keuthen et al., 2000; Killen et al., 2000), we obtained group-specific abstinence rates from the authors. For the 3rd study (Prochazka et al., 1998), we assigned an effect size estimate of 0.00 and a one-tailed *p* of .50 following the recommendation by Rosenthal (1995). For all studies, we extracted data on point-prevalence abstinence that had been derived on an intent-to-treat basis. Effect size estimates were weighted by study sample sizes (weighted effect size = d_+). A negative sign indicated lower abstinence rates for history positive smokers. Next, to determine the overall strength of the association between depression history and cessation outcome, we calculated the mean effect size for short- and long-term abstinence.

We examined the consistency of individual study effect sizes in the third step. To maintain the assumption of independent sets of effect sizes, we included only one effect size estimate from each study for each category of outcome. When a study offered more than one outcome that met our criteria for either short- (≤ 3 months) or long-term cessation (≥ 6 months), we selected the furthest assessment time point that fit within our definition. For example, if a study assessed abstinence at both 1-week and 1-month postquit, we selected the 1-month data and coded them as "short-term" outcome. If an aggregated effect size was found to be heterogeneous, outlier effects were deleted individually and we recalculated the homogeneity statistic (Q_w). Outliers were deleted one at a time until we observed a homogeneous effect (i.e., variability around the mean is no greater than that expected from sample error alone).

In the fourth step, we calculated effect sizes separately for females and males to examine whether gender influenced either the magnitude or direction of the aggregated effect sizes for either short- or long-term cessation. Of the 15 studies, 3 reported gender-specific abstinence rates (Covey et al., 1993; Covey, Glassman, & Stetner, 1999; Hall et al., 1998). For the 12 studies in which these data were unavailable, we sent a letter to the authors requesting them. We obtained gender-specific abstinence data

for all but 3 studies (Ginsberg et al., 1995; Glassman et al., 1988; Prochazka et al., 1998). In the final step, we tested whether any of the methodology or treatment factors were significant moderators of the depression–outcome relationship. A fixed-effects model was used for all tests of between-class effects (Q_b).

Results

A summary of the coded study characteristics is presented in Table 1. Studies were predominantly clinical trials (93%; $n = 14$) involving "healthy" smokers (87%; $n = 13$). Except for the study by Muñoz, Marin, Posner, and Perez-Stable (1997), all of the treatment studies excluded smokers with current medical or psychiatric illness. The majority of studies involved intensive interventions (67%; $n = 10$) combining cognitive–behavioral therapy and pharmacotherapy (73%; $n = 11$). Biochemically verified abstinence (e.g., expired carbon monoxide) was obtained in most studies (80%; $n = 12$). Most depression assessments were structured interviews (73%; $n = 11$). Across the 15 studies, the mean percentage of smokers with a history of depression was 34% ($SD = 15.0$; range = 12% to 64%). Overall, 2,984 participants were involved. Twenty-nine percent of these ($n = 875$) were classified as having a history of depression. Data on treatment drop out by depression history were available in 5 of 14 treatment studies (Glassman et al., 1993; Ginsberg et al., 1995; Hall et al., 1998; Keuthen et al., 2000; Niaura et al., 1999). None showed a differential dropout.

Table 1
Characteristics of Coded Studies

Variable	No. of studies	%
Sampling		
Clinical	14	93
Epidemiological	1	7
Design		
Prospective	15	100
Cross-sectional	0	0
Sample		
Healthy	13	87
Medical	0	0
Psychiatric	0	0
Mixed	2	13
Treatment modality		
Unaided	1	7
Behavioral treatment	3	20
Combined treatment	11	73
Treatment intensity[a]		
Minimal	4	27
Intensive	10	67
Abstinence definition		
Point prevalence	15	100
Continuous abstinence	0	0
Prolonged abstinence	0	0
Abstinence assessment		
Self-report	3	20
Biochemical validation	12	80
Type of depression assessment		
Single item	1	7
Questionnaire	3	20
Structured interview	11	73

[a] Numbers do not sum to 15 because Breslau, Kilbey, and Andreski (1993) was not a treatment study.

Effect of History of Depression on Smoking Cessation

Contrary to expectations, there was no effect of history of depression on short-term abstinence, $d_+ = -.05$, 95% confidence interval (CI) = $-.14$, .04, counternull $d_+ = -.10$, $p = .18$. The test of homogeneity revealed a homogeneous effect, $Q_{w(12)} = 17.37$, $p = .18$, indicating consistency among the effect size estimates of short-term abstinence (see Figure 1). Only 2 of 13 studies (Covey et al., 1993; Glassman et al., 1988) supported the hypothesis that history of depression negatively influences cessation outcome. We observed a similar pattern for long-term abstinence, where only 1 of 12 studies (Glassman et al., 1993) yielded a significant effect size estimate (see Figure 2). Again, when effect sizes were aggregated, the effect of depressive history was nonsignificant, $d_+ = -.06$, 95% CI = $-.15$, .04, counternull $d_+ = -.12$, $p = .18$, and homogeneous, $Q_{w(12)} = 13.79$, $p = .31$. Results were unchanged when the one nontreatment study (Breslau, Peterson, Schultz, Chilcoat, & Andreski, 1998) was excluded from the analysis, $d_+ = -.05$, 95% CI = $-.15$, .04, $p = .21$. The test of between-class effects revealed nonsignificant differences between short- and long-term outcome, $Q_{b(1)} < 0.00$, $p = .99$. Sample sizes and intent-to-treat quit rates for short- and long-term outcome are presented in Table 2.

Analyses of Moderator Effects

Given that women are almost twice as likely as men to experience depression (Weissman et al., 1996), we considered it plausible that gender might influence the magnitude and/or direction of the association between history of depression and smoking cessation. Gender-specific effect sizes for short- and long-term abstinence were computed using Hedges and Olkin's formula for proportion/frequency data (see equation).

For men, when effect sizes were aggregated for short-term outcome, history of depression did not influence abstinence rates, $d_+ = -.01$, 95% CI = $-.15$, .13, $p = .84$. The test of homogeneity revealed a homogeneous overall effect, $Q_{w(10)} = 11.23$, $p = .34$. We observed the same for long-term abstinence. The overall effect size was nonsignificant, $d_+ = -.09$, 95% CI = $-.25$, .06, $p = .14$, and homogeneous, $Q_{w(8)} = 3.87$, $p = .87$.

When effect sizes of short-term outcome were aggregated for women, results revealed a nonsignificant effect of history of depression on abstinence, $d_+ = .05$, 95% CI = $-.07$, .17, $p = .37$, that was heterogeneous, $Q_{w(10)} = 18.64$, $p = .04$. Deletion of one outlier (Covey et al., 1999) yielded a homogeneous overall effect, $d_+ = .07$, 95% CI = $-.05$, .20, $p = .19$, $Q_{w(9)} = 14.73$, $p = .10$. The effect for women for long-term cessation also was nonsignificant, $d_+ = -.05$, 95% CI = $-.18$, .07, $p = .37$, and heterogeneous, $Q_{w(8)} = 24.83$, $p = .002$. Deletion of two outliers (Covey et al., 1999; Glassman et al., 1993) yielded a homogeneous effect, $Q_{w(6)} = 24.83$, $p = .05$, that remained nonsignificant, $d_+ = .09$, 95% CI = $-.06$, .24, $p = .19$. Similar to the procedure followed in the overall analysis, we conducted tests of between-class effects to examine whether gender moderated the association between history of depression and smoking cessation. Results of the analysis of short-term abstinence revealed no difference between men and women in effect size estimates, $Q_{b(1)} = 0.84$, $p = .36$. For long-term abstinence, the difference approached significance, $Q_{b(1)} = 2.79$, $p = .09$.

We also considered it plausible that the association between history of depression and smoking cessation may be moderated by
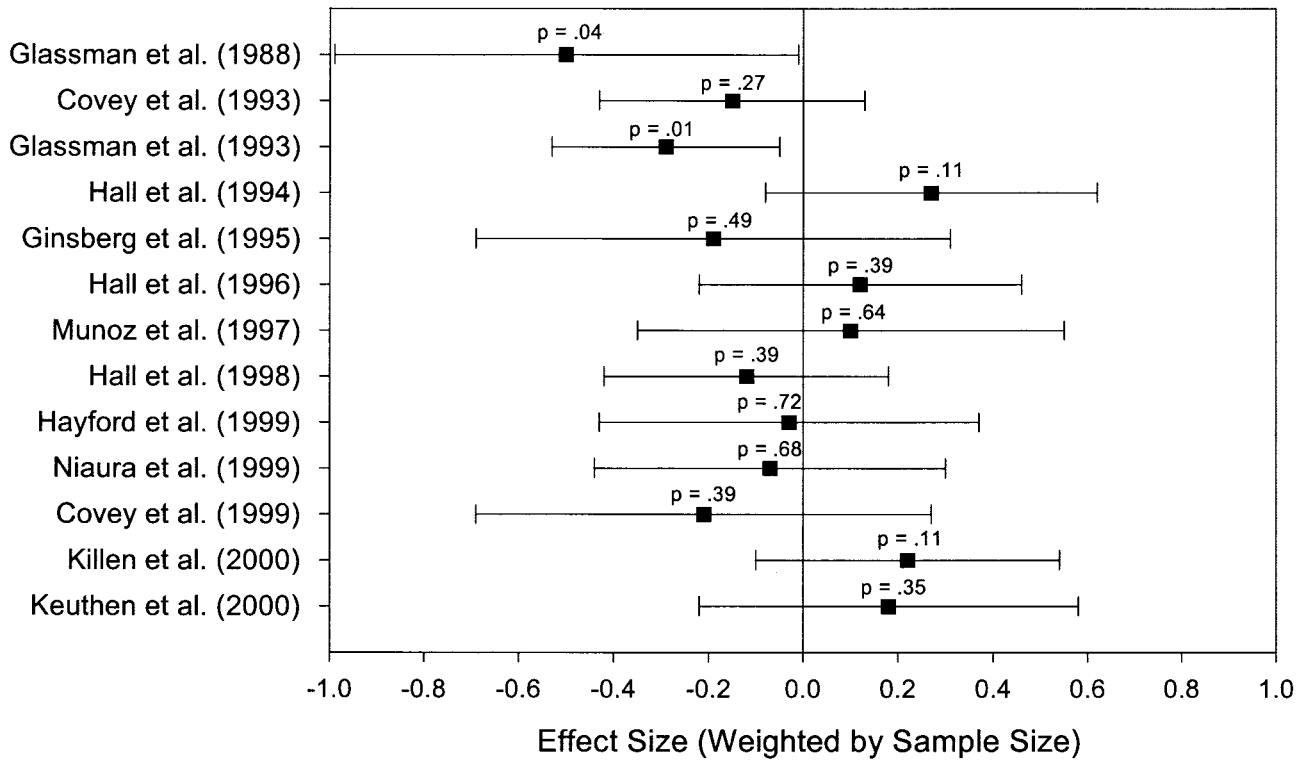
Figure 1. Effect size estimates for short-term abstinence (≤ 3 months) weighted by sample sizes.
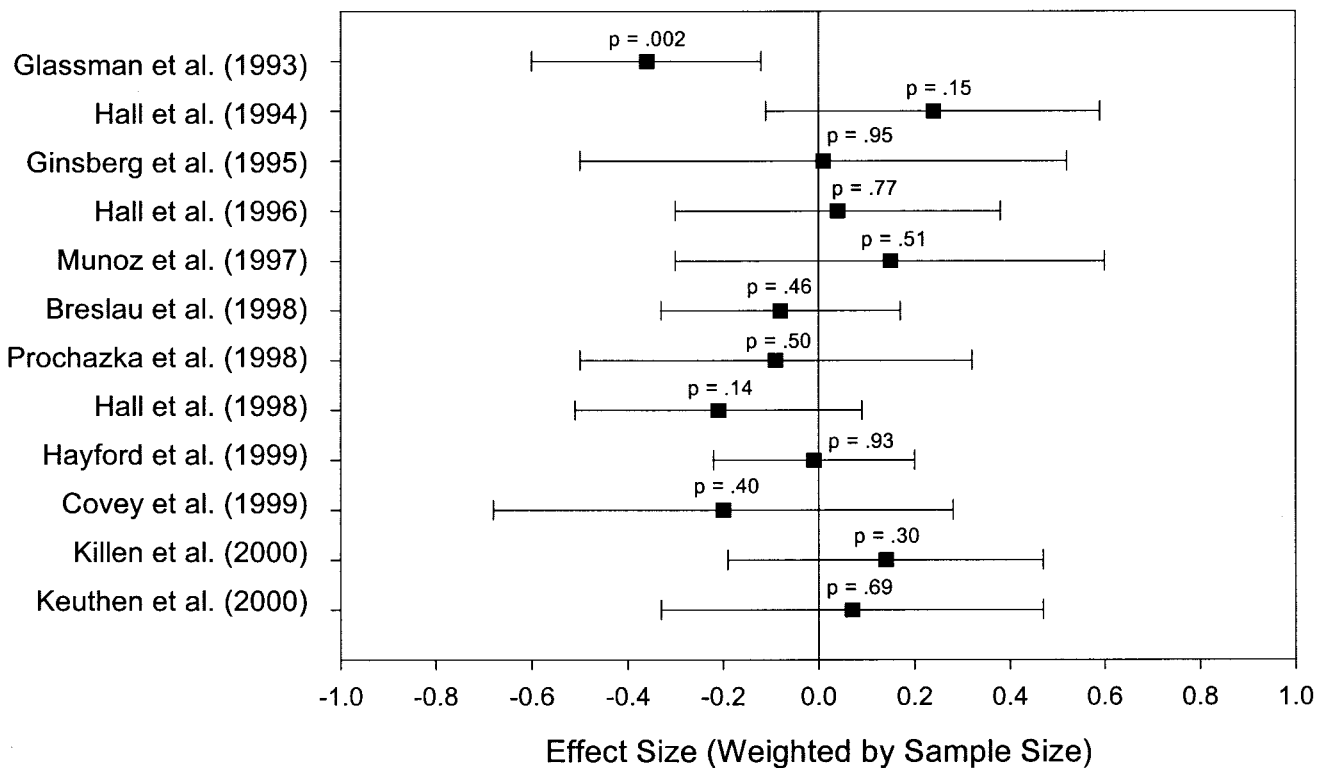

Figure 2. Effect size estimates for long-term abstinence (≥ 6 months) weighted by sample sizes.

Table 2
Sample Sizes and Intent-to-Treat Quit Rates Across Studies for Smokers Positive (Hx+) Versus Negative (Hx−) for History of Depression at Short- and Long-Term Outcome

Study	N (Hx+/Hx−)	Short term		Long term	
		% quit (Hx+/Hx−)	Time	% quit (Hx+/Hx−)	Time
Glassman et al. (1988)	71 (43/28)	33/57	4 week	—	—
Covey et al. (1993)	220 (73/147)	22/29	10 week	—	—
Glassman et al. (1993)	300 (113/187)	24/30	10 week	3/13	26 week
Hall et al. (1994)	149 (46/103)	61/48	12 week	39/29	52 week
Ginsberg et al. (1995)	62 (27/35)	48/57	2 week	15/14	52 week
Hall et al. (1996)	201 (44/157)	41/35	12 week	30/29	52 week
Muñoz et al. (1997)	83 (53/30)	21/17	12 week	28/17	26 week
Breslau et al. (1998)	281 (90/191)	—	—	19/23	5 year
Hall et al. (1998)	199 (65/134)	46/52	12 week	26/34	64 week
Prochazka et al. (1998)	214 (26/188)	—	—	—	26 week
Covey et al. (1999)	68 (36/32)	31/41	4 week	17/25	26 week
Hayford et al. (1999)	615 (114/501)	32/33	6 week	19/20	52 week
Niaura et al. (1999)[a]	183 (64/119)	25/19	4 week	—	—
Killen et al. (2000)	224 (45/179)	44/34	10 week	29/23	26 week
Keuthen et al. (2000)	114 (36/78)	25/18	10 week	8/6	26 week

Note. Abstinence rates are presented using the following format: (percentage abstinent for depression history positive/percentage abstinent for depression history negative). Dashes indicate the data are not available.
[a] Sample sizes and quit rates are based on the entire sample of participants who completed the trial ($N = 183$), as opposed to only the subsample ($n = 133$) studied in Niaura et al. (1999).

methodological or treatment characteristics. Cell sizes for most of the proposed moderators were small and unequal (see Table 1). We analyzed the variables in which there were at least two cells with greater than two cases. Results showed that the effect of history of depression on short- or long-term abstinence did not differ as a function of sample composition, time interval since last depressive episode, treatment modality or intensity, nature of smoking status, or depression assessment.

Discussion

A strength of meta-analyses is that they have the potential to provide an objective appraisal of the empirical evidence (Hedges & Olkin, 1985). We found that a lifetime history of major depression did not independently increase the risk of either short- or long-term smoking cessation failure. Moreover, we found that the influence of depression on abstinence was no greater for female smokers than male smokers. Although limited by the homogeneity of study characteristics, as well as the small and unequal sample sizes, we also observed that none of the methodology or treatment factors moderated the depression–abstinence relationship.

Our findings indicate that knowing whether a smoker has a history of depression yields little or no predictive information regarding his or her ability to stop smoking within the context of intensive smoking cessation treatment. It remains possible that recurrent depression, in contrast to single-episode depression, might have negative implications for smoking cessation. The rationale is that a multiple episode history may reflect a substantial underlying vulnerability to disorder (Zubin & Spring, 1977). Single-episode depression, in contrast, may occur serendipitously even among individuals of low psychopathologic vulnerability, if they encounter sufficiently major loss or other significant life stressors. Three studies have distinguished between smokers with single versus recurrent depression. Glassman et al. (1993) found

that smokers with recurrent depression were at a greater risk for relapse than those with a single-episode history. In a study by Covey et al. (1999), women with recurrent depression, but not men, were at increased risk for relapse. The hypothesis that a recurrent history of depression, as opposed to single-episode depression, increases risk for poor outcome also was supported in a recent study by Brown et al. (2001) that tested the efficacy of mood management-smoking cessation treatment versus standard treatment in 179 smokers. All participants had a lifetime history of depression. Among those who received standard treatment, history of recurrent depression, but not single-episode depression, predicted relapse. Overall, smokers with recurrent depression who received mood management were more likely to be abstinent than those who received standard treatment.

Risk for cessation failure among depression prone smokers is likely conveyed through a combination of enduring trait vulnerability, reflected by a history of recurrent depression, and a vulnerable state, reflected by elevated depressive symptomatology prior to treatment (Borrelli et al., 1999; Niaura & Abrams, 2001). Future research should determine the attributes that characterize the depression vulnerable smokers who are at greatest risk for failure. On the basis of our findings, simply knowing that a smoker has a history of depression is uninformative regarding his or her ability to stop smoking. Potentially more informative predictors that warrant further investigation include recurrence of depression, episode duration or recency, or even specific symptoms (e.g., depressed mood) or clusters of symptoms (Niaura & Abrams, 2001). Because of possible differences in rates and symptoms of depression across adulthood (Karel, 1997), future studies should also consider the influence of age.

Also unanswered is whether current major depression is a significant barrier to smoking cessation. One might expect depressed patients to be at high risk for cessation failure, given that even low levels of pretreatment depressive symptomatology predict time to

relapse (Niaura et al., 2001). However, treatment-related quit rates among smokers with current depression have rarely been studied. Depressed smokers are almost always excluded from smoking cessation treatment studies, especially those involving antidepressant pharmacotherapy. There have been only two published studies involving smokers with current major depression (Muñoz et al., 1997; Thorsteinsson et al., 2002). Results of both indicate that depressed patients may be capable of achieving short-term abstinence at rates comparable to those of nondepressed smokers, although a question can be raised about the representativeness of depressed people with sufficient motivation and energy to seek cessation treatment.

Several limitations should be considered. First, given that the current meta-analysis involved fixed-effects modeling of a homogeneous sample, our findings generalize only to the types of studies represented: "healthy" smokers involved in clinical trials of intensive, combined pharmacological plus psychological interventions. Whether they generalize to smokers with concurrent medical and/or psychiatric illness, continuous or prolonged abstinence, cross-sectional studies of the association between depression and smoking status, or prospective, population-based smoking cessation studies remains to be determined. Second, despite the large sample of studies identified through the literature search, only a small number reported an assessment of lifetime history of depression and evaluated its association with smoking cessation. Consequently, the power of our statistical tests was low (.24 for the analysis of short-term outcome and .23 for that of long-term outcome). The extent to which this should influence interpretations of our findings is uncertain. Using the procedures developed by Hedges and Pigott (2001) for computing the power of statistical tests in meta-analyses, we estimated that an additional 61 studies, each involving 198 participants (12,078 overall), would be required for power = .80. Even if sufficiently powered and statistically significant, it is unlikely that effect sizes of the magnitude we observed (short-term $d_+ = -.05$, long-term $d_+ = -.06$) would be meaningful clinically. Third, only 4 of 15 studies (Glassman et al., 1993; Hall, Muñoz, & Reus, 1994, Hall et al., 1996, 1998) included in our meta-analysis were designed to test whether history of depression influences cessation outcome. Only 1 (Killen et al., 2000) was designed to detect gender differences in outcome. Studies based on post hoc analyses of outcome data, as opposed to those designed to test the moderating influence of third variables using stratified randomization, have the potential to be misleading (Killen, Fortmann, Varady, & Kraemer, 2002). Future studies examining the moderating influences of depression and gender on cessation outcome should stratify randomization on these factors.

Refining understanding of whether and how depression-vulnerable smokers may be at heightened risk for smoking cessation failure is especially crucial given the extent to which both clinicians and researchers have accepted the early, but most often unreplicated, finding that a history of depression is a barrier to quitting smoking. A negative consequence of this assumption from a research perspective has been the premature focus on developing intensive, specialized treatments for all smokers with a positive history of depression. From a clinical perspective, it is possible that many history-positive smokers have been either encouraged to pursue unnecessarily intensive treatments or indirectly discouraged from quitting altogether, even though they were as likely as history-negative smokers to achieve abstinence.

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Appendix

Summary of Methodology and Treatment Characteristics for Studies Included in the Meta-Analysis

Study	Sampling	Sample	Entry smoking	Depression exclusion	Abstinence assessment	Treatment modality	Treatment intensity	Depression assessment
Glassman et al. (1988)	clinical	healthy	≥20 cigs/day[a]	current	self-report	combined	intensive	struct interview (SADS)
Covey et al. (1993)	clinical	healthy	≥20 cigs/day	<6 months	biochemical	combined	intensive	struct interview (SCID)
Glassman et al. (1993)	clinical	healthy	≥20 cigs/day	<6 months	biochemical	combined	intensive	struct interview (SCID)
Hall et al. (1994)	clinical	healthy	>10 cigs/day	<6 months	biochemical	combined	intensive	struct interview (DIS)
Ginsberg et al. (1995)	clinical	healthy	≥10 cigs/day	<6 months	biochemical	behavioral	intensive	struct interview (DIS)
Hall et al. (1996)	clinical	healthy	≥10 cigs/day	<3 months	biochemical	combined	intensive	self-report (comp DIS)
Muñoz et al. (1997)	clinical	mixed	≥3 cigs/day	none	biochemical	behavioral	minimal	struct interview (DIS)
Breslau et al. (1998)	epi	mixed	none	none	self-report	unaided	no treatment	struct interview (DIS)
Hall et al. (1998)	clinical	healthy	>10 cigs/day	<3 months	biochemical	combined	intensive	self-report (comp DIS)
Prochazka et al. (1998)	clinical	healthy	≥10 cigs/day	current	biochemical	combined	intensive	self-report (comp DIS)
Covey et al. (1999)	clinical	healthy	≥20 cigs/day	current	biochemical	combined	intensive	struct interview (SADS)
Hayford et al. (1999)	clinical	healthy	≥15 cigs/day	current	self-report	combined	minimal	struct interview (SCID)
Niaura et al. (1999)	clinical	healthy	daily	current	biochemical	behavioral	minimal	two-item self-report
Keuthen et al. (2000)	clinical	healthy	daily[b]	current	biochemical	combined	intensive	struct interview (SCID)
Killen et al. (2000)	clinical	healthy	≥10 cigs/day	current	biochemical	combined	minimal	struct interview (SCID)

Note. Entry smoking = required or observed smoking rate; biochemical = biochemical confirmation of self-reported smoking status; depression exclusion = exclusion criteria for time interval since last depressive episode. cigs = cigarettes; struct = structured; SADS = Schedule for Affective Disorders and Schizophrenia; DIS = Diagnostic Interview Scale; SCID = Structured Clinical Interview for the *DSM–IV*; comp DIS = computerized version of the DIS; epi = epidemiological.
[a] Also required 50% reduction in cigs/day by quit date.   [b] Also required expired carbon monoxide levels ≥ 8 parts per million.