

Pre-cessation depressive mood predicts failure to quit smoking: the role of coping and personality traits*

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ABSTRACT

Aims To examine whether mood, personality and coping predict smoking cessation and whether the associations of personality and coping are mediated through depressed mood. **Setting** Multicenter ($n = 8$) smoking cessation trial. **Participants** A total of 600 smokers (≥ 15 cigarettes/day) without current depression who participated in a smoking cessation study. **Measurements** The outcome was continuous abstinence during the last 4 weeks of the 3-month trial: depressed mood was measured by the Beck Depression Inventory (BDI), personality by the Revised NEO Personality Inventory (NEO-PI-R) and coping by the Revised Ways of Coping Checklist (RWCC). **Findings** A total of 14.7% (88/600) were abstainers. Controlling for potential confounders, baseline BDI independently predicted smoking cessation. Smokers with $\text{BDI} \geq 10$ were less likely to quit than those with $\text{BDI} < 10$ (odds ratio: 6.39, 95% CI: 1.44–28.3, $P = 0.01$). Compared to $\text{BDI} < 10$ smokers, $\text{BDI} \geq 10$ smokers had significantly higher scores for neuroticism and lower scores for extraversion and conscientiousness (NEO-PI-R). On the RWCC, $\text{BDI} \geq 10$ smokers scored higher for blame self, wishful thinking and problem avoidance and they scored lower on problem focus than smokers with $\text{BDI} < 10$. A mediational analysis showed that neither personality traits nor coping skills predicted directly smoking cessation. However, low level of problem focusing and social support seeking predicted a negative outcome via depressed mood. **Conclusion** A BDI score ≥ 10 , even in smokers who do not meet a current diagnosis of major depression, directly predicts inability to quit. This suggests the utility of assessing depression symptoms in routine smoking cessation care.

Keywords Beck Depression Inventory, coping, personality traits, smokers, smoking abstinence.

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INTRODUCTION

In order to predict failure of attempts to stop smoking, previous history of major depressive disorder (MDD) or depressed mood have been found in some studies [1–7] but not in others [8]. On balance, the evidence suggests that there is some effect, although the mechanism is not clear [9].

The present study examined the effect of mood, measured through the Beck Depression Inventory (BDI) [10,11], on the ability to quit smoking. A relationship between depressed mood and MDD has been supported in many studies of smokers in which smokers with past

MDD have been shown to score higher on psychological ratings of negative affect, including depressed mood, anxiety and anger [12–16], and lower on ratings of self-esteem and self-efficacy [17]. Thus, assessment of mood could be a particularly useful predictor of success/failure of smoking cessation both because of its inherent validity as a measure of depression, but also because of its ease of administration as a self-report questionnaire.

In this study, we also explored associations involving coping skills and personality traits, constructs that have been associated with depression and smoking behaviors. For example, in a clinical trial of nicotine gum, impaired coping skills were found to predict depressed mood as well

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as failure to stop smoking [18] and several studies have found that, among smokers with past MDD, cessation-induced depressive symptoms are more likely to occur among those characterized by maladaptive coping [19,20]. Additionally, ability to quit smoking has been shown to be related to personality traits [21,22] and temperament [23], thought to be associated with specific genetic polymorphisms [21,22]; however, the literature on this issue has so far been inconsistent [24]. This inconsistency may reflect different pathways underlying the effect of personality on smoking cessation; for example, personality traits may be direct predictors of ability to quit smoking but also indirect predictors through their effects on mood which, in turn, can be a direct predictor of ability to quit independently or not of the individual's genetic predisposition. Consequently, we propose that indirect effects of coping and personality variables underlie the observed effects of depression on smoking behaviours, and that failure to consider those effects may account for some of the inconsistencies that have characterized the association between depression and smoking cessation. Increased understanding of these relationships may suggest new cognitive or behavioural interventions that can manage or correct difficulties encountered during the smoking cessation process.

METHODS

Participants

The participants were 600 smokers recruited through newspaper, radio and television advertisements to participate in a randomized, double-blind, multi-site, therapeutic trial of smoking cessation comparing three doses of a reversible monoamine oxidase A inhibitor, bupropion, to placebo. The trial consisted of a 3-month treatment period and a follow-up at 6 months. There was no effect of treatment on abstinence rate. All participants received standardized counselling according to the National Cancer Institute recommendations [25]. The main outcome measure was sustained abstinence during the last 4 weeks of the treatment period based on self-report and expired air carbon monoxide ≤ 10 parts per million (p.p.m.). All participants had smoked 15 or more cigarettes per day over the past year, and should have a motivation level to quit of ≥ 7 on a 10-point scale ranging from 1 to 10. Only one participant per household was included. Exclusion criteria were: pipe or cigar users, smokeless tobacco users, use of nicotine replacement therapies, bupropion, nortriptyline or any other drug treatment for smoking cessation, or participation in a formal behaviour modification program for smoking cessation during the 3 months prior to inclusion. Psychiatric exclusion criteria were: life-time history of schizophre-

nia, schizoaffective disorders, delusional disorder, bipolar disorder, dysthymia or depression with psychotic features, current primary psychiatric diagnoses including depressive episode, obsessive compulsive disorder within 3 months, signs of organic brain damage such as dementia, current alcoholism or other non-nicotine drug abuse within the past 12 months. Psychiatric exclusion criteria were established using the Mini-International Neuropsychiatric Interview (MINI) [26] which is based on the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV [27]). Other exclusion criteria included any unstable medical condition, current seizure disorder, administration of benzodiazepines within 1 week before starting the study, uncontrolled hypertension, current acute or chronic disease conditions, myocardial infarction within the past 3 months, pregnancy, lactation or refusal to use contraception. The research protocol was submitted by each study site to the respective Institutional Review Boards and approval was obtained. Participants were included if they gave their written consent to participate after the study aims, constraints and risks had been explained to them. Fifty-two per cent of the sample was female; 85% were Caucasian, 8.8% were African American, 3% were Hispanic and 2% were Asian American. The mean age was 43.7 (SD = 11.3) years, mean body mass index was 26.8 (SD = 5.3) kg/m² and mean Fagerström Test for Nicotine Dependence (FTND) [28] score was 5.6 (SD = 2.1).

Procedure

After an initial telephone call interview, those who met preliminary entry criteria were invited to a screening clinic visit. Participants completed a medical examination with a study physician and the MINI International Interview was administered by a trained researcher to assess psychiatric inclusion criteria. The included participants completed the baseline questionnaires (demographics, smoking-related items, Beck Depression Inventory [11] and the Revised Ways of Coping Checklist [29] at the clinic site, while the Revised NEO Personality Inventory (NEO-PI-R) [30] was completed by the participant at home and returned to the site at the next visit. Visits were scheduled weekly. The target quit day was scheduled at day 7 after starting study medication.

Measures

Personality

The Revised NEO Personality Inventory (NEO-PI-R) is a concise measure of five major dimensions or domains of personality [30]. The instrument has been shown to be appropriate for both males and females and for all ages.

The five domain scales and 30 facet scales allow a comprehensive assessment of adult personality. Form S (self-report), which was used in this study, consists of 240 items answered on a five-point scale. The five domains are as follows: neuroticism, extraversion, openness, agreeableness and conscientiousness. Each domain is composed of six facets. To avoid multiplication of variables and comparison, only the domains were analysed in the present study. A general tendency to experience negative affect states such as anxiety, hostility and depression and the inability to resist impulses and desires underlies the neuroticism domain. A high score on extraversion describes people who are warm, gregarious, assertive, active, talkative, preferring large groups and gatherings. Openness to experience includes: active imagination, aesthetic sensitivity, attentiveness to inner and outer worlds, intellectual curiosity, preference or variety. Agreeableness indicates tendencies towards interpersonal closeness, trust, compliance, altruism and tender-mindedness. Conscientiousness refers to qualities of competence, self-discipline, achievement striving, order and deliberation.

Mood

Mood was assessed by the Beck Depression Inventory (BDI). The 21-item version was used [11]. Item ratings range from 0 to 3, and the total score may range from 0 to 63. A cut-off of 10 was used to distinguish smokers with and without some levels of depression. BDI scores ≥ 10 are considered to indicate mild to moderate levels of depression symptoms [10] and it has been shown that BDI scores ≥ 10 predict mortality after myocardial infarction [31] and cardiac events after coronary artery bypass graft surgery [32] independently of smoking status, giving a clinical validity to this cut-off. Moreover, a sensitivity analysis showed that the optimal cut-off for major depression in patients having had a myocardial infarction is BDI ≥ 10 . This cut-off has a negative predictive value of 97.9%, a sensitivity of 81.8% and a specificity of 78.7% [33].

Revised Ways of Coping Checklist (RWCC)

An event is considered stressful when the person considers it as harmful. The person thus decides what kind of coping strategies he/she is to use to reduce the potential harm. Smoking cessation can be considered by smokers as a stressful event and one can hypothesize that smokers with the ability to cope with stressful events may be more likely to quit smoking. The RWCC yields the following factors: problem-focused coping: management of the source of stress; wishful thinking: wishing that one could manage the situation; seek social support: talk to others and accept their sympathy; blame self: feels responsible

for the problem; avoidance: refusal to believe that the problem exists [29]. The RWCC consists of 57 questions rated from 0 to 3. The instructions stated: 'We are interested in the degree to which you will use each of the following thoughts/behaviors in order to deal with smoking cessation'.

Withdrawal symptoms and desire to smoke

Signs and symptoms of tobacco withdrawal were assessed by a daily diary [34], and the desire to smoke was also assessed as suggested by Hughes & Hatsukami [35]. All items were scored from 0 (none) to 4 (severe). In the present analysis, the change in total withdrawal symptoms score and desire to smoke between the pre-treatment period and the day 7 after quit day were used as predictor variables.

Data analysis

The main dependent variable was smoking cessation, defined as continuous abstinence during the last 4 weeks of the study and biologically verified through carbon monoxide ≤ 10 p.p.m. during clinic visits at weeks 8–12. Data were analyzed on an intention-to-treat basis. A secondary analysis was carried out to identify predictors of early abstinence, i.e. day 7 after quit day. Missing data for abstinence were considered as lack of abstinence, as recommended [36]. Frequencies were compared with the χ^2 test; continuous variables by the Mann–Whitney test for independent samples; multiple analyses of variance (MANOVA) was used to compare NEO-PI-R and RWCC scores when controlling for age, treatment and sex. To identify predictors of smoking cessation, backward multiple logistic regression was performed. Although no treatment effect was observed, treatments were included in all analyses as a covariate. Data are presented as means and standard deviations if not indicated otherwise. A P -value ≤ 0.05 was considered significant. For data analysis SPSS version 11.5 (Chicago, IL) was used.

A mediational analysis following Baron & Kenny [37] was conducted to identify a model that would explain the inter-relationships among particular personality traits, coping skills, depressed mood and smoking cessation as the outcome variable. A given variable functions as a mediator to the extent that it accounts for the relation between the predictor and the outcome variable. The usual criteria for a variable to be considered as mediator are: (a) variations in levels of the independent variable account significantly for variations in the presumed mediator; (b) variations in the mediator account for significant variations in the outcome variable; and (c) when the previous conditions are controlled, there is no significant relationship between the independent and the outcome variable (for more details see [37, pp. 1176–7]).

Table 1 Comparison of selected variables between abstinent and nonabstinent smokers at day 7 after quit day and at the end of the study (week 8–12: sustained abstinence).

	Abstinence at day 7			Sustained abstinence		
	Abstinent smokers n = 53	Non-abstinent smokers n = 547	P-value	Abstinent smokers n = 88	Non-abstinent smokers n = 512	P-value
Age (years)	44.9 ± 10	43.5 ± 11	0.419	46.4 ± 12	43.2 ± 11	0.015
Sex (%)			0.635			0.07
Female	26 (49)	260 (47)		38 (43.2)	275 (53.7)	
Male	27 (51)	287 (53)		50 (56.8)	237 (46.3)	
Body mass index (kg/m ²)	26.9 ± 4.9	26.8 ± 5.3	0.812	27.9 ± 5.9	26.6 ± 5.1	0.03
Ethnicity			0.004			0.3
Caucasian	38 (71.7)	472 (86.3)		78 (88.6)	432 (84.4)	
African American	8 (15.1)	45 (8.2)		6 (9.8)	47 (9.2)	
Hispanics	3 (5.7)	15 (2.7)		0 (0)	18 (3.5)	
Asian American	1 (1.9)	11 (2)		2 (2.3)	10 (2)	
Other	3 (5.7)	4 (0.7)		2 (2.3)	5 (1)	
FTND	4.9 ± 2	5.6 ± 2.1	0.024	4.9 ± 2.3	5.7 ± 2	0.002
Change in desire to smoke score between baseline and day 7 after quit day	−0.44 ± 1	0.02 ± 0.9	0.001	−0.26 ± 0.9	0.03 ± 0.9	0.007
Change in total withdrawal score between baseline and day 7 after quit day	0.06 ± 0.8	0.24 ± 0.6	0.139	0.16 ± 0.6	0.25 ± 0.7	0.37
Beck Depression Inventory at baseline (%)			0.626			0.009
< 10	48 (92.3)	489 (90.2)		84 (97.7)	453 (89.2)	
≥ 10	4 (7.7)	53 (9.8)		2 (2.3)	55 (10.8)	
NEO PI-R domains*			0.246			0.717
Neuroticism	72.2 ± 2.9	72.3 ± 0.9		73 ± 2.3	72 ± 1	
Extraversion	117.6 ± 2.5	114 ± 0.8		116 ± 2	114 ± 0.8	
Openness	115.6 ± 2.7	112.4 ± 0.8		115 ± 2	112 ± 0.9	
Agreeableness	128.1 ± 2.2	123.8 ± 0.7		124 ± 1.6	124 ± 0.7	
Conscientiousness	121.5 ± 2.6	121.4 ± 0.8		121 ± 2	121 ± 0.8	
RWCC factors*			0.146			0.067
Problem-focused	2.23 ± 0.05	2.23 ± 0.02		2.16 ± 0.04	2.24 ± 0.02	
Seeks social support	1.99 ± 0.07	1.93 ± 0.02		1.95 ± 0.05	1.93 ± 0.02	
Blame self	1.71 ± 0.08	1.78 ± 0.03		1.68 ± 0.07	1.78 ± 0.03	
Wishful thinking	1.49 ± 0.08	1.51 ± 0.03		1.5 ± 0.07	1.51 ± 0.03	
Avoidance	1.35 ± 0.07	1.49 ± 0.02		1.4 ± 0.05	1.49 ± 0.02	

*MANOVA controlling for treatment, age and sex. FTND: Fagerström Test for Nicotine Dependence; NEO PI-R: NEO Personality Inventory Revised; RWCC: Revised Ways of Coping Checklist. Data are means ± SD or S.E. if otherwise not indicated.

RESULTS

Predictors of abstinence

Table 1 shows univariate comparisons between abstinent and non-abstinent smokers both at the early phase of the study (day 7 after quit date, biologically verified through carbon monoxide ≤ 10 p.p.m) and also at the end of the study (intent-to-treat population, abstinence defined as continuous abstinence during the last 4 weeks of the study and verified biologically through carbon

monoxide ≤ 10 p.p.m. during clinic visits at weeks 8–12: sustained abstinence). At day 7 after quit day, desire to smoke decreased in abstinent and did not change in non-abstinent smokers. Early abstainers had had lower FTND scores and there were fewer Caucasians and more African Americans among early abstainers than among non-abstainers. There was no difference in BDI, RWCC or NEO-PI-R scores.

Sustained abstinent smokers were older, had a higher BMI and lower FTND than non-abstinent smokers. The

Table 2 Revised Ways of Coping Checklist (RWCC) factors and NEO Personality Inventory Revised (NEO-PI-R) domains in smokers according to the Beck Depression Inventory (BDI) score.

	<i>BDI < 10, n = 543</i>	<i>BDI ≥ 10, n = 57</i>	<i>P-value</i>
RWCC factors*			
Problem-focused	2.23 ± 0.02	2.13 ± 0.05	0.045
Seeks social support	1.94 ± 0.02	1.81 ± 0.07	0.057
Blame self	1.75 ± 0.03	2.03 ± 0.08	0.001
Wishful thinking	1.47 ± 0.03	1.93 ± 0.08	0.0001
Avoidance	1.45 ± 0.02	1.74 ± 0.06	0.0001
NEO-PI-R domains**			
Neuroticism	70.5 ± 0.9	88.8 ± 2.8	0.0001
Extraversion	115.1 ± 0.8	107.3 ± 2.5	0.03
Openness	113.2 ± 0.9	108.4 ± 2.7	0.097
Agreeableness	124.5 ± 0.7	120.8 ± 2.2	0.102
Conscientiousness	122.3 ± 0.8	113 ± 2.6	0.001

*MANOVA controlling for age, treatment and sex: Wilk's $\lambda = 0.916$, $F(5,585) = 10.76$, $P < 0.0001$. **ANOVA controlling for age, treatment and sex: Wilk's $\lambda = 0.911$, $F_{5,439} = 8.526$, $P < 0.0001$. Data are means ± SE.

proportion of smokers with a baseline $BDI \geq 10$ was higher among the non-abstainers ($P < 0.009$). Overall, RWCC scores were somewhat different between abstainers and non-abstainers ($P < 0.10$), and none of the NEO-PI-R personality trait scores showed a difference.

To ascertain the independence of observed predictors of abstinence, backward stepwise conditional logistic regression that included sex and the variables that yielded a P -value < 0.05 in the univariate comparisons was conducted. In the population of smokers with continuous abstinence during the last 4 weeks of the study the baseline BDI score (β : 1.72, SE: 0.74, OR: 5.59, 95% CI: 1.31–23.9, $P = 0.018$) and, to a lesser extent, an increase in desire to smoke between baseline and day 7 after quit day (β : 0.29, SE: 0.14, OR: 1.34, 95% CI: 1.01–1.78, $P = 0.04$), were associated with failure to quit. When the same data were reanalysed while controlling for abstinence at day 7 after quit day, the effect of BDI to predict failure to quit remained significant (β : 1.85, SE: 0.75, OR: 6.39, 95% CI: 1.44–28.3, $P = 0.015$) but the effect of desire to smoke did not ($P = 0.24$). Thus, smokers with baseline $BDI \geq 10$ were more than six times more likely to be non-abstinent than those with $BDI < 10$.

Predictors of early, day 7 abstinence were different. According to the backward stepwise conditional logistic regression, early abstinence was predicted only by FTND (β : 0.15, SE: 0.07, OR: 1.17, 95% CI: 1.007–1.35, $P = 0.04$) and change in desire to smoke (β : 0.56, SE: 0.17, OR: 1.75, 95% CI: 1.26–2.44, $P = 0.001$) but not by BDI. Ethnicity was not a predictor in the multivariate analysis.

Relationships between mood, personality and coping

Table 2 shows the relationship of personality traits and coping factors with the BDI. In the analysis of NEO-PI-R

scale scores, smokers with elevated depressed mood had significantly higher neuroticism, lower conscientiousness score and lower extraversion scores than did smokers with low depression scores. On the RWCC, high BDI scorers had significantly lower scores on problem-focused, on seek social support ($P = 0.057$, NS) and significantly higher scores on wishful thinking, blame self and avoidance.

Mediational analysis

The mediational analysis followed the steps suggested by D. A. Kenny (available at: <http://davidakenny.net/cm/mediate.htm>). Each step was controlled for the potential confounders: age, sex and treatment. In our case the independent variables were RWCC factors and NEO-PI-R domains, the hypothetical mediator variable was BDI and the outcome variable was sustained smoking abstinence. In the first step we tested whether the independent variables were correlated with the outcome. Among the RWCC factors, problem-focused was associated significantly with outcome: abstinence (β : 0.85, OR: 2.35, 95% CI: 1.09–5.1, $P = 0.03$), seek social support and avoidance were associated marginally with outcome (β : 0.57, OR: 0.56, 95% CI: 0.31–1.02, $P = 0.06$) (β : -0.62, OR: 1.86, 95% CI: 0.95–3.66, $P = 0.07$); but blame self and wishful thinking were not. None of the NEO-PI-R domains was associated significantly with smoking cessation outcome. All these variables were, thus, dropped from further mediational analysis.

The second step addressed the question of whether the independent variables are associated with the mediator variable. Among the RWCC factors, problem-focused (β : -1.13, OR: 0.32, 95% CI: 0.13–0.82, $P = 0.017$) and

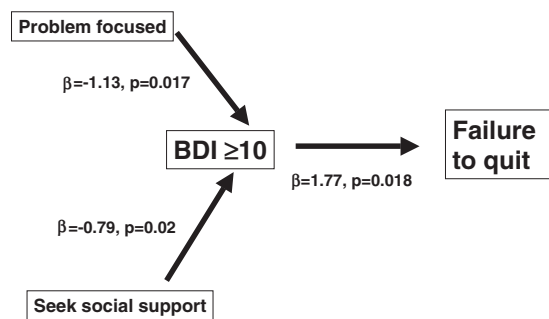
COPING factors

Figure 1 Model presenting the effect of coping factors acting through the mediator variable Beck Depression Inventory (BDI) score on failure to quit smoking.

seek social support ($\beta: -0.79$, OR: 0.45, 95% CI: 0.23–0.88, $P = 0.02$) were inversely associated with BDI (Fig. 1).

The third step should address the question of whether the mediator variable affects the outcome while controlling for the initial independent variables. When controlling for RWCC variables, BDI was associated significantly with smoking cessation outcome ($\beta: 1.77$, OR: 5.68, 95% CI: 1.36–25.2, $P = 0.018$).

To establish that the mediator completely mediates the effect of the independent variables on the outcome (fourth step), the effect of the independent variables on the outcome should be zero when controlling for the mediator variable. Thus, when controlling for BDI, none of the RWCC factors was associated with smoking cessation outcome.

DISCUSSION

An adverse effect of depressed mood, as indicated by $BDI \geq 10$, on smoking cessation was observed in this study. This finding is consistent with observations reported in multiple studies, such as those that also measured depressed mood with the BDI [17,38,39] or with the Center for Epidemiologic Studies Depression Scale (CES-D) [18,40,41]. Our results are similar to those of Cinciripini *et al.* [6], who found that depressed mood was a main inverse predictor of smoking cessation. These authors also identified post-cessation self-efficacy as a mediator of pre-cessation mood on smoking abstinence. However, only a few studies have addressed the relationships between coping, depression and smoking or smoking cessation. Rabois & Haaga [19] compared smokers and non-smokers with or without a previous history of depression and tested the inter-relationship of those factors with coping as measured by the Ways of Responding test of coping. Neither depression or smoking

history was related to positive coping; and negative coping was also unrelated to smoking or non-smoking status. However, negative coping was significantly higher in those with a history of depression and the quality of coping, i.e. its potential to improve mood, was significantly lower in smokers than non-smokers. Based on those inter-relationships, Rabois & Haaga [19] suggested that an inclination to choose negative coping strategies by depressed smokers may underlie their inability to stop smoking. In line with the latter findings, Kahler *et al.* [20] demonstrated in 435 participants in a smoking cessation drug trial that, among smokers with a positive MDD history, those with elevated depressed mood scored higher on maladaptive coping than did smokers with negative MDD history. Both the level of depressive symptoms and positive MDD history were associated positively with dysfunctional attitudes and maladaptive coping. According to their model, a positive MDD history leads to maladaptive coping and dysfunctional attitudes, and both result in depressive symptoms. Moreover, in a trial of nicotine gum, Kinnunen *et al.* [18] found that depressive symptoms, which predicted smoking cessation failure, was predicted significantly by both fewer coping resources and perceiving more stress in the smokers' lives. The data also showed that coping scores were lowest among early relapsers and increased according to the length of abstinence.

The present study is in agreement with Kahler *et al.* [20], in elucidating potential effects of maladaptive coping strategies on depressive symptoms, and with Kinnunen *et al.* [18], in showing adverse effects of poor coping on depressive symptoms and smoking cessation. However, it goes further in demonstrating effects of specific coping deficits and personality traits. Using the RWCC, the study shows that, among smokers desiring to quit smoking through a cessation trial, low levels of problem-focusing and social support seeking may influence outcome via depressive mood. Although blame self, wishful thinking, problem avoidance and neuroticism were higher and extraversion and conscientiousness lower in smokers with $BDI \geq 10$, they seemed not to be related, either directly or indirectly, via mood to smoking cessation outcome.

The cognitive theory of depression posits that dysfunctional attitudes can render individuals vulnerable to depression and may lead to its clinical manifestations [10]. Kahler *et al.* [20] have suggested that among depressed smokers, efforts to stop smoking can activate those dysfunctional attitudes leading to less coping and, at the end, higher likelihood of failure to quit. Our data support the previously known direct effects of depressive symptoms, and suggest that an indirect role of depression may occur through its association with impaired coping skills. The possibility of a wide-ranging mechanism by

which depression affects smoking cessation suggests the utility of assessing the intensity of depression symptoms in routine smoking cessation care. The possibility that certain maladaptive coping mechanisms mitigate successful cessation through their effects on depressive mood suggests additional avenues and therapeutic approaches through which the disadvantage brought forth by negative mood state such as depression may be alleviated. Valid assessments of those psychological constructs, not conducted routinely in smoking cessation programs, may be helpful, if not necessary.

Several studies, in addition to the present one, have consistently shown that depressive symptoms predict smoking cessation failure. The effect of a history of the diagnostic form of depression, i.e., MDD, on smoking cessation has been reported in a number of clinical [1,2,42] and epidemiological studies [3,4]. However, as reported by Hitsman *et al.* [8], more negative than positive associations of major depression history and smoking cessation have been observed. A possible explanation to the inconsistent effect of MDD may lie in the interaction between the diagnosis and symptomatic depression, as suggested in an early paper by Hall *et al.* [14] which reported that among smokers with a positive history of MDD those who had low depression scores at baseline were more likely to become non-smokers. Thus, a current score on a depression symptom scale may be more predictive of cessation than history of MDD [7].

Predictors of early (7 days) and late (sustained, end-of-treatment abstinence) were different (see Table 1). A lesser increase in desire to smoke predicted day 7 but not late (month 3) abstinence and, conversely, BDI predicted late but not early abstinence. Further studies are needed to allow a better differentiation of early and late predictors of smoking cessation.

Limitations

Because data about previous history of depression were not collected in this study, we could not evaluate the relationship between this putative predictor and intensity of depressive mood, personality traits or coping skills in predicting smoking cessation. Because personality traits, especially neuroticism, have been reported to be related to some particular genetic polymorphisms, the mediational analysis would have been strengthened by including the putative effect of genetic determinants. One can also argue that relationships between coping skills–mood–smoking cessation follows the sequence mood–coping skills–smoking cessation. The two studies describing mediation analysis [6,20] identify mediators using the model mood–mediator–smoking cessation. In the present study, however, mood but not coping skills or the mainly genetically determined personality traits was related

directly to smoking cessation. This study did not control for socio-economic status, educational level and for smoking status of other people in the household, all known predictors of failure to quit.

CONCLUSIONS

This study showed that depressed mood (i.e. BDI score ≥ 10) even in smokers who do not meet a current diagnosis of major depression predicts inability to quit. This suggests the utility of assessing the intensity of depression symptoms in routine smoking cessation care. The study also showed that certain maladaptive coping mechanisms influence mood in such a way that they mitigate successful cessation indirectly. These relationships suggest possible approaches through which the disadvantage brought forth by a negative mood state such as depression may be alleviated.

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