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## Correlates of motivation to quit smoking among alcohol dependent patients in residential treatment

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### Abstract

Substance use and smoking co-occur at high rates and substance abusers smoke more and have greater difficulty quitting smoking compared to the general population. Methods of increasing smoking cessation among alcoholics are needed to improve their health. This study investigated predictors of motivation to quit smoking among patients early in residential treatment for substance abuse. The 198 alcohol dependent patients were participating in a larger smoking study at an inner-city residential substance abuse treatment program. Motivation was measured by the Contemplation Ladder. A hierarchical multiple regression was conducted to assess whether perceived barriers to smoking cessation and self-efficacy about quitting were associated with motivation to quit smoking independent of the influence of degree of tobacco involvement, substance use, and comorbid depressive symptoms. Motivation was higher with longer previous smoking abstinence, fewer barriers to quitting, and greater self-efficacy but was not influenced by smoking rate, dependence, or gender. While the combination of alcohol and drug use, alcohol and drug problem severity, and depressive symptoms predicted motivation, no one of these variables was significant. Since barriers to change and self-efficacy are potentially modifiable in treatment, these could be salient targets for intervention efforts. This could be integrated into treatment by assessing barriers and providing corrective information about consequences and methods of overcoming barriers and by providing coping skills to increase confidence in one's ability to quit smoking.

### Keywords

Smoking cessation; Motivation; Substance abuse

### 1. Introduction

Alcoholics who smoke are a unique population of smokers who may need special considerations when designing and implementing smoking cessation treatment. First, the prevalence of smoking among alcohol dependent people is three to four times that of the general population with about 80–95% reporting smoking (Kozlowski et al., 1986; Burling and Ziff, 1988; Joseph et al., 1990). Additionally, the proportion of heavy smokers is higher among alcoholics than among nonproblematic drinkers (Zeiner et al., 1985) and the general population (Burling and Ziff, 1988). Second, alcoholics on average are more addicted to nicotine than are

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smokers who do not abuse substances: alcoholics smoke higher nicotine cigarettes, smoke more cigarettes per day, score higher on nicotine dependence measures, and have higher carbon monoxide (CO), nicotine and cotinine levels compared with other smokers (Burling and Ziff, 1988; Keenan et al., 1990; York and Hirsch, 1995). Alcohol abusers also initiate smoking and become regular smokers at an earlier age than do smokers in general (DiFranza and Guerrero, 1990). Third, alcoholics are more likely to have increased health effects because they are more susceptible to the combined health risks associated with smoking concurrent with excessive substance use (Battjes, 1988; Zacny, 1990). Finally, more deaths among alcoholics are attributed to smoking-related causes than to alcohol use (Hurt et al., 1996), thus increasing smoking cessation among alcoholics could result in considerable improvement to the health and longevity of this population.

While many substance abusers have a positive attitude toward quitting smoking during substance abuse treatment many others are disinterested (Monti et al., 1995; Orleans and Hutchinson, 1993). This reluctance could be due in part to concern that attempting to quit will have a negative impact on sobriety (Asher et al., 2003; Bobo et al., 1987; Irving et al., 1994; Joseph et al., 1990; Monti et al., 1995). Many alcoholics report that they use smoking to cope with their urges to use alcohol or drugs (Rohsenow et al., 2005). Thus, while some would be receptive to smoking interventions during substance abuse treatment, many others would be disinterested (Irving et al., 1994; Joseph et al., 1990; Kozlowski et al., 1989; Monti et al., 1995).

Alcoholic smokers who try to stop smoking have lower rates of success with cessation than do smokers in general (DiFranza and Guerrero, 1990; Gulliver et al., 2000). Alcoholics assigned to smoking cessation treatment during alcohol treatment have generally had no increase in smoking cessation compared to alcoholics in control groups (Monti et al., 1995). Most smoking cessation programs are designed to help people who are prepared to take action and may be inappropriate for those who are not motivated to quit or who are ambivalent. An intervention mismatched to the patient's readiness to change is more likely to result in resistance, attrition from treatment, and/or treatment failure (DiClemente et al., 1991; Miller and Rollnick, 1991). Substance abuse treatment programs provide a potentially valuable window of opportunity for intervening with tobacco use in this population. One approach might be to increase patients' motivation to reduce smoking, possibly through brief advice or motivational interventions (Rohsenow et al., 2002).

Smoking interventions may be improved by knowledge about determinants of motivation to quit smoking in this population. According to motivational theories (e.g., Deci, 1992; Dweck, 1992), alcoholics may have lower motivation to quit smoking if the value of smoking cessation is low, if the perceived salience of tobacco use is high (as indicated by greater tobacco involvement), if the perceived salience of other competing goals (such as reducing drug use or depression) is high, or if the goal appears to be imposed by someone else (extrinsic motivation). This may be why alcoholics are more motivated to quit smoking with longer abstinence from alcohol (Kozlowski et al., 1989), if they also have less depression (Hitsman et al., 2002), or when endorsing intrinsic reasons for quitting (Curry et al., 1991). Similarly, more depression symptoms or alcohol involvement predicted less success with quitting smoking in the general population (Garvey et al., 1992; Kinnunen et al., 1996; Niaura et al., 2001). Furthermore, social learning theory predicts that motivation to change substance use will be lower among people with lower self-efficacy about their ability to quit that substance (Abrams and Niaura, 1987), as was supported for smoking relapses in multivariate analyses (Garvey et al., 1992; Niaura et al., 1989). Perceived barriers to quitting smoking (Asher et al., 2003) may decrease motivation for quitting by increasing the perceived difficulty or costs of quitting. In general population smokers, cessation failure was greater for smokers reporting more barriers to quitting (Macnee and Talsma, 1995). Predictors of abstinence among self-quitters include length of previous

abstinence, greater self-efficacy, and less alcohol use (Garvey et al., 1992). Such predictors need to be investigated with alcoholics as well.

Understanding the relationships of tobacco use and other substance use to motivation to quit smoking is useful for designing effective interventions for tobacco use among substance dependent adults. It is important to investigate potential determinants of motivation such as degree of tobacco involvement, severity of substance use, severity of depressive symptoms, self-efficacy about quitting, and perceived barriers to smoking cessation. While several of these are not easily modifiable, self-efficacy and barriers could be addressed in intervention studies. The current study examines whether these determinants affect motivation to quit smoking during the first week of a substance abuse treatment program, using a multivariate analysis to control for the influence of the other variables.

## 2. Methods

### 2.1. Participants

Participants were 198 substance abusers participating in a study of brief motivational interventions for smoking in an urban inpatient state-subsidized substance abuse facility (Rohsenow et al., 2002). The facility's policy permits smoking in designated areas and the program does not otherwise address tobacco use. The mean length of stay at the facility was 40 (S.D. = 20.3) days. Patients were eligible for the study if they had a current alcohol dependence diagnosis based on the criteria of the Structured Clinical Interview for DSM-IV-Patient version (SCID; First et al., 1995), smoked at least 10 cigarettes/day for the past year, and smoked daily for the past month. Of those eligible to be recruited, 73% consented to participate. The most common reasons for refusal were not wanting to be in research with its extra burdens and lack of interest in a smoking study.

### 2.2. Procedures

All procedures were approved by the Institutional Review Boards of Brown University, the Providence Veterans Affairs Medical Center, and the Providence Center (the clinical site). The study was described to patients as a project designed to provide smokers with information about the effects of smoking and patients were told that desire to quit smoking was not necessary. They were not told that this was a clinical smoking intervention. Informed consent and baseline assessments were completed during the first week of inpatient treatment, typically 3–6 days after admission. All assessments were conducted by university-employed research interviewers. Confidentiality was assured and no information from these assessments was shared with clinical staff at the agency.

### 2.3. Measures

Motivation to quit smoking was measured by the Contemplation Ladder (Biener and Abrams, 1991), a 10-point scale of motivation to change smoking, anchored at each point, which provides a single continuous measure of motivation to quit. The Barriers to Quitting Smoking in Substance Abuse Treatment (BQS-SAT) is an 11-item true-false instrument of perceived barriers to quitting smoking (Asher et al., 2003). The items sample several domains of perceived barriers to quitting including some affective and physical effects of withdrawal, losing some benefits of smoking, the effects of smoking cessation on sobriety and urges to drink, and self-efficacy about smoking. The measure consists of a single reliable factor. Information about specific barriers endorsed in this sample can be found in Asher et al. (2003). The Timeline Followback (TLFB) administered for the 30 days pre-treatment was used to collect cigarette quantity and frequency information (Brown et al., 1998). The Fagerstrom Test for Nicotine Dependence (FTND; Heatherton et al., 1991) was given as a measure of tobacco dependence. Two items assessed self-efficacy for quitting smoking: "How likely is it

that you will be a non-smoker 1 year from now?" (using a 5-item Likert scale from 1, not at all likely, to 5, very likely) and "How confident are you that you could quit smoking for good today if you wanted to?" (using a Likert scale from 1, not at all confident, to 5, very confident). An index of self-efficacy was created by taking the mean of the two items. A smoking history questionnaire developed for this study included length of longest prior period of abstinence and number of years since established smoking (years smoking half of a pack per day). The TLFB interview (Sobell and Sobell, 1980) administered for the 6 months pre-treatment was given to provide alcohol and other drug use quantity and frequency information. The Addiction Severity Index (ASI; McLellan et al., 1992) drug use composite index (McGahan et al., 1986) was used to assess severity of drug problems. The Alcohol Dependence Scale-Revised (ADS-R; Skinner and Allen, 1982), which consists of a single reliable factor, was given as a quantitative measure of severity of alcohol dependence. The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was given as a measure of depressive symptomology. The total score of the CES-D is used in this study.

### 3. Results

#### 3.1. Participant characteristics

The mean age of the sample was 34.5 years (S.D. = 7.9). In the sample, 59% were male, 13% were married or living together, 29% were employed, and 71% had at least a high school education. The majority of participants were White (84%), 13% were African American, and 3% were of other races. Eight-two percent were highly physically dependent on nicotine according to the criterion of smoking their first cigarette within 30 min of waking (Pomerleau et al., 1990). Participants smoked a mean of 23.8 (S.D. = 10.2) cigarettes/day in the month prior to treatment and had a mean score of 5.7 (S.D. = 2.1) on the FTND.

The average Contemplation Ladder score for these patients was 5.78 (S.D. = 1.52). The majority of patients (62%) were contemplating changing their smoking in the next 6 months (contemplation stage), 21% were not planning to change their smoking in the next 6 months (precontemplation stage), and 17% were planning to quit in the next 30 days and had made a serious quit attempt in the past year (preparation stage).

#### 3.2. Predictors of motivation to quit smoking

Variables entered into the same analysis were checked for collinearity, and no pair was collinear. No variables violated assumptions of normality.

First, the relationship of the Contemplation Ladder score with demographic variables was checked using correlations for continuous variables and *t*-tests for dichotomous variables to determine if it was necessary to control for the influence of any of the demographic variables in the multiple regression analysis. Men had higher ladder scores ( $M = 6.0$ , S.D. 1.5) than women ( $M = 5.5$ , S.D. = 1.5,  $t(197) = 1.97$ ,  $p = 0.05$ ). Marital and employment status, age, ethnicity and years of education were not significantly related to motivation to quit smoking.

The univariate correlations of the predictors with the Contemplation Ladder are presented in Table 1.

A hierarchical multiple regression was conducted to assess whether perceived barriers to smoking cessation and self-efficacy about quitting were associated with motivation to quit smoking independent of the influence of degree of tobacco involvement, substance use and comorbid depressive symptoms. Tobacco involvement variables were entered on step one along with gender and included tobacco dependence (FTND), longest previous abstinence from cigarettes, number of cigarettes per day pre-treatment, and years smoking at least half a pack of cigarettes per day. Substance use and comorbid depressive symptoms were entered on step

two and included percentage of drinking days pre-treatment, ADS score, number of drug use days pre-treatment, ASI drug severity index and CES-D score. Self-efficacy for quitting smoking and BQS-SAT were entered on step three. Table 2 displays the standardized regression coefficients (beta) and associated semipartial correlations ( $sr^2$ , indicating percent of variance accounted for by the variable) after entry of all IV's, the  $R^2$  change (percent of variance) for each step, and total  $R^2$  after entry of each step.  $R$  was significantly ( $p < 0.05$ ) different from zero at the end of each step. After step 3, with all IVs in the equation,  $R = 0.64$ ,  $F(2, 118) = 6.69$ ,  $p < 0.001$ . Significant individual predictors were longest prior abstinence, BQS-SAT, and smoking self-efficacy.

To investigate whether the effects of longest prior smoking abstinence on motivation was mediated by self-efficacy, three regressions were conducted to test a mediational hypothesis (Baron and Kenny, 1986). The first criterion was met, that self-efficacy was significantly associated with longest abstinence,  $R = 0.32$ ,  $F(1,146) = 16.46$ ,  $p < 0.001$ . The second criterion was met, that motivation was significantly related to self-efficacy,  $R = 0.49$ ,  $F(1,197) = 63.42$ ,  $p < 0.001$ . The third criterion was not met, that after controlling for self-efficacy, longest abstinence was no longer significantly related to motivation or the relationship was significantly reduced, as that term remained significant,  $R = 0.53$ ,  $F(2,145) = 28.29$ ,  $p < 0.001$ .

#### 4. Discussion

Given the high rate of smoking among alcoholics and their resistance to smoking cessation efforts, identifying predictors of motivation to may be beneficial in order to improve intervention approaches. While some predictors are historical or trait-like and therefore difficult to modify, others may lend themselves to intervention efforts.

Of smoking history variables, only length of the longest prior smoking abstinence predicted motivation to quit smoking early in substance abuse treatment. This finding is consistent with predictors of successful quitting among smokers in general (Garvey et al., 1992). It is understandable that greater previous success results in greater expectations of success and interest in trying again. It was more surprising that pre-treatment smoking rate and dependence measures had little impact on motivation in either univariate or multivariate analysis. That gender was unrelated when controlling for smoking history is consistent with research on self-quitters in general (Garvey et al., 1992).

After smoking history was controlled for, motivation to quit smoking was affected by the linear combination of level of concurrent depression and/or pre-treatment degree of alcohol dependence and/or amount of drug use in multivariate analysis. However, none of these individually were statistically significant predictors. While more depressive symptoms predicted less success in smoking cessation across studies (Kinnunen et al., 1996; Niaura et al., 2001), depressive symptoms in of themselves do not impede motivation to quit smoking among outpatient alcoholics (Hitsman et al., 2002) or in this group of inpatient alcoholics where the trend, if anything, was for more depressive symptoms to be associated with more rather than less motivation to quit smoking. Thus, patients with greater depressed affect, drug use, or problems from alcohol are as likely as their less troubled peers to be interested in quitting smoking.

After controlling for smoking history, comorbid substance use and depressed affect, two more easily modifiable variables, both predicted motivation to quit smoking in multivariate analysis (controlling for the influence of each other as well as all previous variables). First, alcoholics who reported more barriers to smoking cessation had less motivation to quit. This suggests that any intervention to motivate alcoholics to quit smoking must directly address these barriers on an individualized basis. This can be done by assessing the particular barriers endorsed and



then providing corrective information about consequences and methods of coping with particular concerns. As reported elsewhere (Asher et al., 2003), the most frequently endorsed barriers concerned tobacco withdrawal symptoms, which need to be discussed in terms of realistic expectations, urge-specific coping skills that patients can apply, and smoking pharmacotherapies. A barrier frequently endorsed that is specific to alcoholics involves concerns that quitting smoking during alcohol treatment could jeopardize sobriety (Asher et al., 2003). Corrective information needs to be given that alcoholics who quit smoking soon after quitting drinking have longer sobriety than alcoholics who do not quit smoking (e.g., Bobo et al., 1998; Sobell et al., 1995). Only mandatory smoking cessation programs have been found to have iatrogenic effects on outcomes (Joseph et al., 1993; Monti et al., 1995).

The other modifiable predictor of motivation was self-efficacy about smoking cessation. While self-efficacy was predicted by length of previous successful smoking abstinence, the effects of smoking abstinence on motivation were not found to be mediated by self-efficacy. Alcoholics who believe they have the ability to succeed in quitting smoking are more motivated to try. Self-efficacy about ability to quit also predicted successful long-term abstinence among smokers in the general population (Garvey et al., 1992; Niaura et al., 1989). Lower self-efficacy may result in part from past failures, as evidenced by our data and that of Niaura et al. (1989). However, providing training in effective coping skills and a menu of choices of approaches may be a way to increase confidence in one's ability to quit smoking (Abrams and Niaura, 1987).

This study is limited to data from alcoholics in an inner-city state funded program and results may differ with alcoholics with higher income and education. Another limitation is the potential that the sample may not be representative of all alcoholic smokers who enter in-patient treatment. Those who refused to participate in the study may have had least interest in quitting smoking. While we tried minimizing potential bias by describing the study as one examining the effects of smoking, not a clinical intervention, and that desire to quit smoking was not necessary, we cannot directly compare those who agreed to participate with those who refused. The study is also limited to alcoholics in a residential program, so responses of alcoholics in outpatient treatment may differ. However, given the window of opportunity that treatment programs provide, the high prevalence of heavy smoking among alcoholics, and their low quit rates, providing additional information that could be used to improve intervention efforts is crucial. Future research should study a variety of additional theoretically-derived predictors and include a broader range of patients in treatment for substance abuse problems.

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**Table 1**

Univariate correlations of contemplation ladder with pre-treatment smoking history, substance use, depressed affect, self-efficacy for quitting smoking, and barriers for quitting smoking

Variable	<i>r</i>
Smoking history	
Number of cigarettes per day pre-treatment 30 days	0.04
FTND score	-0.06
Years smoking $\geq 10$ cigarettes/day	0.06
Length of longest prior abstinence from cigarettes	0.34***
Substance use and depressed affect	
Pre-treatment percent drinking days	-0.28***
ADS score	-0.04
Pre-treatment number of drug use days	-0.11*
ASI drug severity composite score	0.13*
CES-D score	0.04
Self-efficacy for Quitting	0.49***
BQS-SAT score	-0.28***

\*  $p \leq 0.05$ .

\*\*\*  $p \leq 0.001$ .

**Table 2**

Hierarchical regression of perceived barriers to smoking cessation and self-efficacy about quitting, degree of tobacco involvement and substance use and depression comorbidity as predictors of motivation to change smoking

Variable	$\beta$	$Sr^2$	$R^2$ change	$R^2$
Step 1: smoking history and gender			0.14**	0.14**
Longest prior abstinence	0.28*	0.17		
Years smoking at least half pack per day	0.12	0.12		
Average # cigarettes/day pre-treatment	0.02	0.02		
FTND	0.07	0.05		
Gender	-0.09	-0.08		
Step 2: comorbid substance use and depression			0.09*	0.23**
# drug days pre-treatment	-0.19	-0.13		
% drinking days pre-treatment	-0.12	-0.14		
ADS	0.01	0.03		
ASI drug index pre-treatment	0.18	0.12		
CESD	0.16	0.13		
Step 3: barriers and self-efficacy			0.17***	0.40***
Barriers of quitting	-0.20*	-0.18		
Self-efficacy for quitting	0.37***	0.31		

\*  $p < 0.05$ .

\*\*  $p \leq 0.01$ .

\*\*\*  $p \leq 0.001$ .