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Expectancies for Smoking Cessation among Drug-involved Smokers: Implications for Clinical Practice

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Abstract

Drug-involved smokers may be less motivated to quit smoking because they expect smoking cessation to occasion adverse outcomes (e.g., exacerbation of drug use). Non-treatment-seeking adult smokers from the community (N = 507) reported drug involvement, expectancies for smoking abstinence via the Smoking Abstinence Questionnaire (SAQ), and motivation to quit smoking (desire to quit and abstinence goal). Mediation analyses evaluated the indirect effects of binge drinking, marijuana, cocaine, other stimulant, opiate, and barbiturate/other sedative involvement on motivation to quit smoking through the SAQ *Adverse Outcomes* scale. Adverse outcomes expectancies accounted for a reduced desire to quit smoking and a lower likelihood of endorsing a goal of complete smoking abstinence among those involved with binge drinking, marijuana, cocaine, other stimulants, opiates, and barbiturates/other sedatives. Drug-involved smokers' greater expectancies for adverse outcomes upon quitting smoking may deter smoking quit attempts. Interventions are encouraged to counteract the notion that smoking cessation jeopardizes sobriety.

Keywords

Smoking; Cessation; Expectancies; Alcohol Dependence; Drug Dependence; Substance Dependence; Motivation to quit

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Introduction

Whereas neurobiological and other factors have been implicated in the comorbidity between tobacco and other drug use (e.g., Guydish et al., 2011; Hall & Prochaska, 2009; Pontieri, Tanda, Orzi, Di Chiara, 1996), a lore that cigarette use is therapeutic and supports drug abstinence may contribute to this overlap. Tobacco industry efforts to market cigarettes as medicinal (e.g., Gardner & Brandt, 2006; Prochaska, Hall, & Bero, 2008) as well as the pervasive influence of Alcoholics Anonymous, which has historically viewed smoking cessation as an impediment to sobriety (Bobo & Husten, 2000), are likely culprits in this cultural zeitgeist. Accordingly, less than 20% of drug abuse treatment centers offer smoking cessation counseling (Knudsen, Studts, Boyd, & Roman, 2010), with approximately 40% discontinuing this service over time (Knudsen, Muilenburg, & Eby, 2013). Furthermore, the smoking prevalence among drug abuse treatment staff is as high as 40%, twice the prevalence of the general U.S. population (Guydish, Passalacqua, Tajima, & Manser, 2007), and drug abuse treatment settings are among the only clinical venues that still allow their patients to smoke (Prochaska, 2010). Although policies that require drug abuse treatment facilities to establish tobacco-free sites and provide tobacco interventions have been enacted, they are new and not yet universally adopted (e.g., New York State's tobacco-free services regulation of 2008; see Brown, Nonnemaker, Federman, Farrelly, & Kipnis, 2012 and Eby & Laschober, 2013). While the notion that smoking cessation exacerbates drug use is perhaps most apparent in clinical settings, it nonetheless appears to extend beyond clinical settings (e.g., Hendricks, Wood, & Hall, 2009), and may correspond to a widespread assumption (Bobo & Husten, 2000).

Despite the lore that smoking helps maintain sobriety, smoking cessation interventions delivered to those with drug abuse problems increase the likelihood of drug abstinence by 25% (Prochaska, Delucchi, & Hall, 2004), and quitting smoking during the first year of drug abuse treatment predicts more favorable drug abuse outcomes as long as nine years after the initiation of treatment (Tsoh, Chi, Mertens, & Weisner, 2011). Conversely, drug involvement typically decreases the likelihood of smoking cessation (e.g., Hendricks, Delucchi, Humfleet, & Hall, 2012). While the mechanisms underlying this effect have only recently been investigated (Hendricks et al., 2012), it has been suggested that drug-involved smokers may be less motivated to quit smoking than their non-drug-involved counterparts (e.g., Asher et al., 2003; Hughes & Kalman, 2006).

Are drug-involved smokers less motivated to quit smoking because they have internalized the notion that smoking cessation jeopardizes drug abstinence? The most pertinent findings indicate that between 13% and 70% of alcohol dependent individuals in treatment believe smoking cessation could compromise sobriety, although alcohol- and other drug-dependent individuals in treatment report smoking to cope with drug urges less than half of the time (Asher et al., 2003; Carmody et al., 2012; Rosenhow, Colby, Martin, & Monti, 2005). Nevertheless, differences in expectancies for smoking abstinence between those who are and are not involved with drugs, and the effect of these differences on motivation to quit, have not yet been investigated. Examining non-treatment-seeking smokers rather than the minority of drug-involved smokers who seek treatment (Substance Abuse and Mental Health Services Administration, 2013) would allow not only for comparisons across levels of drug

involvement, but also for generalizability of results to the wider population of cigarette users.

In this study, non-treatment-seeking cigarette users from the community completed a questionnaire of drug involvement, an instrument of expectancies for smoking abstinence, and two distinct indices of motivation to quit smoking. We hypothesized that greater expectancies for those consequences that may be particularly meaningful to drug-involved smokers, namely adverse outcomes upon smoking cessation, would account for lower levels of motivation to quit smoking among those involved with drugs.

Materials and methods

Participants

This research compared participants from a study designed to develop a measure of smokers' abstinence-related expectancies, the details of which can be found elsewhere (Hendricks et al., in press; Hendricks, Wood, Baker, Delucchi, & Hall, 2011). Participants were 507 non-treatment-seeking smokers recruited from the San Francisco Bay Area via community advertisements. Eligibility criteria were as follows: 1) 18 years old; 2) fluent in English; 3) currently smoking 10 cigarettes/day; and 4) expired breath carbon monoxide (CO) levels of 10 parts per million. Participants who met telephone screening criteria were scheduled for an in-person appointment. Upon providing informed consent, participants provided a CO sample and were given a packet of paper-and-pencil questionnaires to complete at their own pace. This study was approved by the institutional review committees of the University of Alabama at Birmingham and the University of California, San Francisco, and therefore complied with the Helsinki Declaration of 1975.

The sample was 53.3% male and 76.1% heterosexual with a mean age of 40.8 years ($SD = 12.4$); 36.5% was White, 29.8% was African American, 17.2% was American Indian, and 16.5% belonged to other racial groups. Participants smoked daily for a mean of 21.05 years ($SD = 12.64$), smoked a mean of 17.84 cigarettes per day ($SD = 7.68$), had a mean Fagerström Test for Cigarette Dependence (FTCD; Fagerström, 2012) score of 4.94 ($SD = 2.14$), and had a mean past 24-hour Minnesota Nicotine Withdrawal Scale (MNWS; Hughes & Hatsukami, 1986) total score of 1.67 ($SD = .94$). Participants reported a mean of 12.18 quit attempts of at least one day ($SD = 18.75$) and a mean of 7.83 quit attempts of at least one week ($SD = 25.61$).

Measures

Drug Involvement—An author-constructed questionnaire provided a definition of a standard drink (“1 drink = 12 oz. beer, 4 oz. wine, or 1.5 oz. distilled spirits”) and asked participants, “How often do you have six or more drinks on one occasion?” (a gender-neutral criterion that may more accurately reflect binge drinking than five or more drinks on one occasion; Lange & Voas, 2001) with the following response options: “never,” “less than monthly,” “monthly,” “weekly,” and “daily or almost daily.” The same questionnaire also asked participants, “How often do you use marijuana?”, “How often do you use cocaine (including crack)?”, “How often do you use other stimulants (e.g., amphetamine,

methamphetamine, etc.)?”, “How often do you use opiates (e.g., heroin, morphine, etc.)?”, and “How often do you use barbiturates or other sedatives?” with the following response options: “never,” “monthly or less,” “two to four times a month,” “two to three times a week,” and “four or more times a week.”

Expectancies for Smoking Abstinence—The Smoking Abstinence Questionnaire (SAQ; Hendricks et al., 2011) was used to measure expectancies for smoking abstinence, instructing participants to rate how likely 55 consequences (i.e., items) would be for them if they quit smoking (0 = “not likely at all” to 6 = “extremely likely”). The SAQ is comprised of 10 scales with adequate to excellent reliability that: 1) demonstrate robust correlations with a number of smoking-related constructs including dependence (Hendricks et al., 2011); 2) mediate the relationships of race and gender with motivation to quit and abstinence self-efficacy (Hendricks et al., in press); and 3) prospectively predict abstinence-induced withdrawal symptoms (Hendricks & Leventhal, in press). In the current study, analyses focused on the *Adverse Outcomes* scale ($\alpha = .75$), which assesses expectancies that quitting would result in a number of negative consequences on seven items, including two items specific to drug use (i.e., “My drug habit would increase if I quit,” “My use of other drugs would increase.”) and five pertaining to unfavorable interpersonal outcomes (i.e., “The people close to me would make fun of me for trying to stop smoking,” “I would feel like a traitor to my fellow smokers,” “I would look less attractive than before,” “Without a cigarette, I would not look as cool,” and “I would feel like I had been bullied into quitting.”) Though only two of seven items refer explicitly to drug use, analyses using these two items only, the five non-drug items only, and the complete scale each yielded similar results (not reported here). Analyses thus used the complete scale. As a priori hypotheses were not developed for the remaining nine SAQ scales, these scales were excluded from primary analyses.

Motivation to Quit—The Thoughts About Abstinence Questionnaire (TAA; Hall, Havassy, & Wasserman, 1990) assessed motivation to quit smoking “at this time” on two distinct items. The first asked participants to rate their “desire to quit smoking” on a 1 to 10 scale (1 = “no desire to quit”, 10 = “full desire to quit”), and the second asked participants to choose one of seven categories that best reflects their abstinence goal: 1) no goal; 2) controlled use; 3) abstinence for a short time, then decide about continued use; 4) smoking occasionally, but not let it be a habit; 5) quit smoking, but might slip; 6) complete abstinence; and 7) other. Both items are consistent predictors of smoking cessation (e.g., Hall, Havassy, & Wasserman, 1991; Hendricks, Delucchi, & Hall, 2010).

Data Analysis

Drug involvement data were positively skewed, comprising largely “never” responses (see Results), and therefore were combined into two categories each for binge drinking, marijuana, cocaine, other stimulants, opiates, and barbiturates/other sedatives: 1) no involvement or 2) involvement (dummy coded 0 and 1, respectively). For each drug, differences in demographic and smoking characteristics between those reporting no involvement and those reporting involvement were examined with analyses of variance and chi-square tests; any characteristics that differed significantly ($p < .05$) between groups were

included as covariates in subsequent analyses. As in prior work (e.g., Hall et al., 1991; McKay, Merikle, Mulvaney, Weiss, & Koppenhaver, 2001), abstinence goal was defined by two categories: 1) endorsement of a goal other than complete abstinence or 2) complete abstinence (dummy coded 0 and 1, respectively).

Consistent with mediation analysis, SAQ *Adverse Outcomes* scale scores and motivation to quit smoking were regressed on each drug involvement variable, and the indirect effects of drug involvement on motivation to quit smoking through SAQ *Adverse Outcomes* scale scores were evaluated in two models (one in which desire to quit was the dependent variable and one in which smoking abstinence goal was the dependent variable) by means of a bootstrap approach (Preacher & Hayes, 2008). In keeping with contemporary recommendations (MacKinnon, Cheong, & Pirlott, 2012), these analyses were conducted whether or not there were significant relationships between drug involvement and motivation to quit.

Results

The prevalence of drug involvement in the sample was as follows: binge drinking = 50.5%; marijuana = 49.9%; cocaine = 28.4%; other stimulants = 20.9%; opiates = 20.1%; and barbiturates/other sedatives = 17.4%. Concordance among all drug involvement pairs ranged from 42% to 78%, with 76.1% of the sample reporting involvement with any drug. Binge drinking involvement was associated with younger age, lower FTCD scores, and greater MNWS total scores; marijuana involvement was more common among men and related to younger age; cocaine involvement was associated with greater MNWS total scores; other stimulant involvement was more common among gay/bisexual participants and related to greater MNWS total scores; opiate involvement was associated with greater FTCD and MNWS total scores; and barbiturate/other sedative involvement was more common among Whites and related to greater FTCD and MNWS total scores. None of the drug involvement variables were associated with self-reported quit attempt history. The following variables were therefore included as covariates in subsequent analyses: age, FTCD and MNWS scores for binge drinking involvement; gender and age for marijuana involvement; MNWS scores for cocaine involvement; sexual orientation and MNWS scores for other stimulant involvement; FTCD and MNWS scores for opiate involvement; and race, FTCD, and MNWS scores for barbiturate/other sedative involvement. Participants reported a mean SAQ *Adverse Outcomes* scale score of 1.45 (SD = 1.12) and a mean desire to quit smoking of 6.37 (SD = 2.70), with 21.1% endorsing a goal of complete smoking abstinence.

Table 1 displays results of the regressions of the *Adverse Outcomes* scale of the SAQ, desire to quit smoking, and smoking abstinence goal on each drug involvement variable. Binge drinking, marijuana, cocaine, other stimulant, opiate, and barbiturate/other sedative involvement were each associated with greater expectancies for adverse outcomes upon quitting smoking. Cocaine and other stimulant involvement were each related to a reduced desire to quit smoking, and binge drinking, marijuana, cocaine, and other stimulant involvement were each associated with a reduced likelihood of endorsing a goal of complete smoking abstinence.

Table 2 shows the results of models testing the indirect effects of drug involvement on desire to quit smoking and smoking abstinence goal through the *Adverse Outcomes* scale of the SAQ. Adverse outcomes expectancies accounted for a decreased desire to quit smoking and a reduced likelihood of endorsing a goal of complete smoking abstinence among those involved with binge drinking, marijuana, cocaine, other stimulants, opiate, and barbiturates/other sedatives.

Because drug involvement was highly concordant, post-hoc analyses attended to polydrug involvement in two ways. First, the indirect effects of involvement with each drug were tested while also controlling for involvement with all other drugs. As shown in Table 3, in these analyses expectancies for adverse outcomes accounted for a decreased desire to quit smoking and a reduced likelihood of endorsing a goal of complete smoking abstinence among those involved with marijuana and opiates only. Second, the indirect effects of polydrug involvement on motivation to quit smoking were evaluated by quantifying the degree of polydrug involvement (coded 1 = involvement with one drug to 6 = involvement with all six drugs; those reporting no drug involvement [$n = 121$] were omitted from analyses). These analyses (not shown in Table 3) revealed that adverse outcomes expectancies accounted for a decreased desire to quit smoking among those reporting greater polydrug involvement (point estimate = $-.10$, bias corrected 95% CI [$-.17, -.04$]) but did not account for a reduced likelihood of endorsing a goal of complete smoking abstinence (point estimate = $-.02$, bias corrected 95% CI [$-.09, .02$]).

Finally, exploratory analyses (linear regression models) evaluated the relationships between drug involvement and the remaining nine scales of the SAQ. Results revealed greater expectancies for barriers to smoking cessation treatment (*Barriers to Treatment* scale; $b = .35, p = .01$) among those involved with binge drinking, weaker expectancies for social support (*Social Support* scale; $b = -.27, p = .02$) among those involved with marijuana, weaker expectancies for social support ($b = -.36, p = .006$) and social improvement (*Social Improvement/Non-smoker Identity* scale; $b = -.28, p = .02$) among those involved with cocaine, and greater expectancies for withdrawal symptoms (*Withdrawal* scale; $b = .36, p = .008$) among those involved with other stimulants. These relatively inconsistent findings across drug involvement variables confirm the primacy of expectancies for adverse outcomes among drug-involved smokers.

Discussion

As hypothesized, drug-involved smokers reported greater expectancies for adverse outcomes when they quit smoking, including the aggravation of drug use (e.g., “My drug habit would increase if I quit,” “My use of other drugs would increase.”) and the disruption of interpersonal functioning (e.g., “The people close to me would make fun of me for trying to stop smoking,” “I would feel like a traitor to my fellow smokers,” “I would look less attractive than before.”). These expectancies were, in turn, associated with decreased motivation to quit smoking. This suggests that the internalization of an unsubstantiated lore may contribute to reduced rates of smoking abstinence among those involved with drugs. Because expectancies for adverse outcomes were not limited to the worsening of drug use problems per se, this lore may diffuse to concerns that are especially relevant to drug-

involved smokers. Indeed, interpersonal factors can be powerful barriers to drug abstinence (e.g., Charney, Zikos, & Gill, 2010; Hunter-Reel, McCrady, & Hildenbrandt, 2009), and drug-involved smokers may view smoking cessation as a threat to drug abstinence in that it complicates their relationships with others (e.g., their “smoking buddies”).

Results from the current study have important clinical implications. Given that smoking cessation during drug abuse treatment is predictive of more favorable drug abuse outcomes (Prochaska et al., 2004; Tsoh et al., 2011) and drug involvement decreases the odds of smoking cessation (e.g., Hendricks et al., 2012), neutralizing the pernicious notion that smoking cessation jeopardizes sobriety should be a priority for drug abuse treatment providers as well as public health interventions. This can be accomplished with increased education on the negative long-term effects of smoking, the interplay of smoking and drug use, and the immediate and long-term beneficial effects of stopping smoking, including a greater probability of abstinence from drugs. Although data on the efficacy of expectancy-based smoking interventions are sparse (see Copeland & Brandon, 2000), future interventions may also consider assessing expectancies for smoking abstinence via the SAQ and challenging endorsed expectancies relating to adverse outcomes. Furthermore, results support the importance of drug abuse treatment facilities adopting smoke-free policies and offering smoking cessation treatment (see Brown et al., 2012 and Eby & Laschober, 2013).

Strengths of this study include its large and diverse sample, assessment of expectancies for smoking abstinence with a psychometrically-sound instrument, and use of a sophisticated data analytic technique (i.e., mediation analysis) to test hypothesized relationships. However, because data were collected cross-sectionally, reverse causal effects cannot be ruled out (Kraemer, Kiernan, Essex, & Knupfer, 2008); drug-involved smokers may in fact hold greater expectancies for adverse outcomes upon smoking cessation because they are less motivated to quit smoking. Though long-established expectancy theory indicates that differences in expectancies drive differences in motivation to quit (Brandon, Juliano, & Copeland, 1999), longitudinal studies can more definitively establish the causal relationships indicated here. Another study limitation is that drug involvement variables were dichotomized. Though dichotomization was necessary to accommodate the positive skew of drug involvement variables, and though drug involvement is undoubtedly more heterogeneous and nuanced than suggested by this yes-no categorization (e.g., comprising individuals with varying degrees of dependence), this is an initial study that sought to explore the possibility that drug involvement might decrease motivation to quit smoking via smokers’ abstinence-related expectancies. Furthermore, our post hoc analysis revealed that adverse outcomes expectancies still accounted for a decreased desire to quit smoking among those reporting greater polydrug involvement, and greater polydrug involvement could be a proxy for more severe or problematic drug use. With these limitations in mind, future research can expand upon current results by: (1) using more precise measures that capture the continuous nature of drug involvement (e.g., severity of dependence); (2) conducting similar studies among individuals in drug abuse treatment; (3) testing the mediating effects of expectancies on smoking cessation and drug cessation outcomes; (4) testing the moderating effects of treatment engagement and other variables (e.g., race and gender) on smoking cessation and drug cessation outcomes; and (5) evaluating the efficacy of expectancy-based smoking interventions.

In sum, the current study suggests that cognitive factors, namely expectancies for smoking abstinence, may contribute to the strong comorbidity between tobacco and other drug use by discouraging attempts to quit smoking. In combination with neurobiological and psychosocial explanations, this perspective provides for a more comprehensive appreciation of the smoking-drug involvement link.

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Table 1

Results of Regressions of the *Adverse Outcomes* Scale of the Smoking Abstinence Questionnaire, Desire to Quit Smoking, and Smoking Abstinence Goal on each Drug Involvement Variable

<u>Drug Involvement Variable</u>	<u>Adverse Outcomes Scale</u>		<u>Desire to Quit Smoking</u>		<u>Smoking Abstinence Goal</u>	
	<u>b</u>	<u>Cohen's <i>d</i></u> <u>[95% CI]</u>	<u>b</u>	<u>Cohen's <i>d</i></u> <u>[95% CI]</u>	<u>b</u>	<u>Odds Ratio</u> <u>[95% CI]</u>
Binge Drinking Involvement	.31	.28 [.10, .45]	-	-.11 [-.29, .06]	-	.59 [.38, .93]
Marijuana Involvement	.44	.40 [.22, .57]	-	-.16 [-.34, .01]	-	.62 [.40, .98]
Cocaine Involvement	.34	.31 [.11, .50]	-	-.23 [-.42, -.03]	-	.58 [.35, .98]
Other Stimulant Involvement	.37	.33 [.12, .55]	-	-.32 [-.54, -.11]	-	.49 [.26, .91]
Opiate Involvement	.48	.43 [.22, .65]	-	-.19 [-.41, .02]	-	.85 [.49, 1.48]
Barbiturate/Other Sedative Involvement	.39	.35 [.12, .58]	-	-.19 [-.42, .04]	.17	1.19 [.67, 2.10]

Note. Drug involvement variables dummy coded 0 for no involvement, 1 for involvement (involvement is the reference group in all analyses); higher scores on *Adverse Outcomes* scale (possible range 0-6) represent stronger expectancies; Desire to Quit Smoking = desire to quit smoking on a 1 to 10 scale (1 = “no desire to quit” 10 = “full desire to quit”); Smoking Abstinence Goal dummy coded 0 for endorsement of a goal other than complete abstinence, 1 for complete abstinence. b = unstandardized regression coefficient. Cohen's *d* = b/pooled within groups standard deviation. Significant findings ($p < .05$) are presented in bold.

Table 2

Results of Models Testing the Indirect Effects of Drug Involvement on Desire to Quit Smoking and Smoking Abstinence Goal through the *Adverse Outcomes* Scale of the Smoking Abstinence Questionnaire

Drug Involvement Variable	Desire to Quit Smoking		Smoking Abstinence Goal	
	Point Estimate	BC 95% CI	Point Estimate	BC 95% CI
Binge Drinking Involvement	-.18	-.35, -.07	-.09	-.23, -.02
Marijuana Involvement	-.25	-.44, -.12	-.12	-.27, -.03
Cocaine Involvement	-.21	-.39, -.08	-.10	-.24, -.02
Other Stimulant Involvement	-.23	-.43, -.08	-.11	-.28, -.02
Opiate Involvement	-.30	-.53, -.13	-.17	-.37, -.06
Barbiturate/Other Sedative Involvement	-.25	-.50, -.07	-.14	-.32, -.03

Note. Drug involvement variables dummy coded 0 for no involvement, 1 for involvement (involvement is the reference group in all analyses); Desire to Quit Smoking = desire to quit smoking on a 1 to 10 scale (1 = “no desire to quit” 10 = “full desire to quit”); Smoking Abstinence Goal dummy coded 0 for endorsement of a goal other than complete abstinence, 1 for complete abstinence. BC = bias corrected. 5000 bootstrap samples. 95% CIs that do not contain zero indicate significant indirect effects. Significant findings are presented in bold.

Table 3

Results of Models Testing the Indirect Effects of Drug Involvement on Desire to Quit Smoking and Smoking Abstinence Goal through the *Adverse Outcomes* Scale of the Smoking Abstinence Questionnaire while Controlling for Involvement with All Other Drugs

<u>Drug Involvement Variable</u>	<u>Desire to Quit Smoking</u>		<u>Smoking Abstinence Goal</u>	
	<u>Point Estimate</u>	<u>BC 95% CI</u>	<u>Point Estimate</u>	<u>BC 95% CI</u>
Binge Drinking Involvement	-.09	-.24, .01	-.05	-.16, .006
Marijuana Involvement	-.15	-.33, -.04	-.08	-.20, -.01
Cocaine Involvement	-.02	-.18, .12	-.008	-.10, .06
Other Stimulant Involvement	-.05	-.24, .11	-.03	-.15, .05
Opiate Involvement	-.19	-.42, -.03	-.10	-.26, -.01
Barbiturate/Other Sedative Involvement	-.06	-.27, .12	-.03	-.18, .06

Note. Drug involvement variables dummy coded 0 for no involvement, 1 for involvement (involvement is the reference group in all analyses); Desire to Quit Smoking = desire to quit smoking on a 1 to 10 scale (1 = “no desire to quit” 10 = “full desire to quit”); Smoking Abstinence Goal dummy coded 0 for endorsement of a goal other than complete abstinence, 1 for complete abstinence. BC = bias corrected. 5000 bootstrap samples. 95% CIs that do not contain zero indicate significant indirect effects. Significant findings are presented in bold.