



Smoking outcome expectancies predict smoking during voucher-based treatment for smokers with substance use disorders[☆]

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ARTICLE INFO

Keywords:

Nicotine dependence
Smoking expectancies
Smoking cessation
Contingent vouchers

ABSTRACT

Objective: Strong expectations regarding positive effects of smoking may reduce the likelihood of successfully quitting. The *Smoking Effects Questionnaire (SEQ)* assesses the importance of seven expected positive and negative effects of smoking. SEQ was used to predict responses to contingent monetary rewards for smoking abstinence among smokers with substance use disorders (SUD).

Methods: Smokers (N = 184) in residential (i.e., 24 h/day) treatment for SUD received 19 consecutive days of either contingent vouchers (CV) for smoking abstinence (twice-daily carbon monoxide [CO] readings) or non-contingent vouchers (NV) plus counseling to motivate smoking cessation. Analyses investigated effects of smoking expectancies on days of smoking within-treatment and number of cigarettes/day at 1 month post-treatment.

Results: Higher positive expectancies for reduced negative affect, weight control, stimulation and positive social effects from smoking were related to more days of smoking during treatment only for participants in the CV condition. Post-treatment, expecting positive social and stimulating effects from smoking were related to more smoking only among CV participants. In both conditions, negative expectancies were largely unrelated to smoking outcomes.

Conclusions: The moderation of CV by positive smoking expectancies suggests that those who rate positive expectancies as more important may require a complementary treatment or different incentives to reduce smoking. The SEQ was probably unassociated with smoking in NV due to little reduction in smoking behavior. Helping smokers with SUD develop alternative ways to produce positive effects sought from smoking may be important to improve initial smoking outcomes.

1. Introduction

Individuals with substance use disorders (SUD) are three times as likely to be dependent on nicotine than those without SUD (Compton, Thomas, Stinson, & Grant, 2007), 78% of heavy substance users smoke cigarettes, and their quit rates are half that of non-substance users (Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002). Smokers in addiction treatment are more likely to die from tobacco-related causes than from alcohol or other drug-related causes (Hurt et al., 1996). Quitting smoking during the first year of SUD treatment significantly predicts better long-term abstinence from substances (Tsoh, Chi, Mertens, & Weisner, 2011). Among illicit substance users, perceptions

of smoking have a considerable influence on smoking behavior, with individuals who perceive smoking to be more risky being less likely to smoke (Richter et al., 2002). Thus, understanding and modifying smoking expectancies among individuals with SUD may have the potential to increase willingness to quit smoking and lead to better smoking cessation outcomes in this population.

The Smoking Effects Questionnaire (SEQ) was designed to assess positive and negative personal outcome expectancies from smoking (Rohsenow et al., 2003) based on decision theory (Edwards, 1954) and social learning theory (Bandura, 1977). It was developed and validated on a general adult population (Rohsenow et al., 2003), with 7th-grade reading level and only 33 items, to be easier for most patients to use

[☆] This research was supported by NIDA grants R01 DA13616, T32 DA016184, L30 DA042415, and by a Senior Research Career Scientist Award from the Department of Veterans Affairs (DJR). There are no conflicts of interest to disclose. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs nor the official views of the National Institutes of Health.

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than measures developed for use with college students. The SEQ consists of seven scales that fall on two higher-order factors (Rohsenow et al., 2003). The SEQ scales assess four positive (i.e., reduced negative affect, stimulation, positive social effects, weight control) and three negative (i.e., negative physical effects, negative psychosocial effects, future health concerns) expected effects of smoking, with scales largely demonstrating good or acceptable internal consistency reliabilities in general population smokers (Rohsenow et al., 2003; Tidey & Rohsenow, 2009).

Prior work using the SEQ has found that expectancies were associated with many important aspects of smoking such as level of nicotine dependence, number of cigarettes smoked per day, cravings, and barriers and intentions to quit smoking. Among a general adult population, higher importance ratings for negative physical effects and positive stimulation effects from smoking were associated with greater nicotine dependence and daily smoking while positive expectancies were positively correlated with temptation to smoke (Rohsenow et al., 2003). Similarly, positive smoking expectancies were associated with greater craving severity and more catastrophic interpretations of cravings among individuals trying to quit (Nosen & Woody, 2009). Among community smokers with schizophrenia, schizoaffective disorder, or without psychiatric illness, reduced negative affect was rated as the most important expected positive effect of smoking (Tidey & Rohsenow, 2009). In all three groups, participants who intended to quit smoking rated the negative expectancies as more important than those who didn't.

Smoking expectancies have also shown to be important in studies of individuals with SUD and may interfere with smoking cessation. Endorsing more positive smoking expectancies was associated with more smoking to cope with substance urges among smokers in SUD treatment (Rohsenow, Colby, Martin, & Monti, 2005). Similarly, greater severity of post-traumatic stress symptoms was indirectly associated with increased smoking and nicotine dependence via the positive smoking expectancy of reduced negative affect among trauma-exposed smokers with SUD (Hruska et al., 2014). Therefore, some individuals with SUD may use cigarettes as a way to ameliorate unwanted substance cravings and affective states. All SEQ expectancies were rated to be of some importance, with reduced negative affect rated as most important, among smokers in Alcoholics Anonymous, representing obstacles to overcome when encouraging smoking cessation (Reich et al., 2008). Indeed, alcohol dependent smokers who endorsed more positive expectancies from smoking also endorsed more perceived barriers to quitting smoking (Asher et al., 2003). Similarly, on a measure of expectancies for smoking abstinence, adverse expectancies of quitting (e.g., increased use of other drugs, not looking as cool or attractive) were associated with decreased motivation to quit smoking among drug-involved community smokers (Hendricks, Peters, Thorne, Delucchi, & Hall, 2014). Thus, expecting cigarettes to provide various important benefits is likely to contribute to a greater reliance on cigarettes, increased smoking and nicotine dependence, and may deter smoking quit attempts and contribute to the low quit rates observed among smokers with SUD.

Finding ways to counteract positive smoking expectancies in smokers with SUD may promote better smoking cessation outcomes in this population. A contingent voucher (CV) based treatment that incentivized expired carbon monoxide (CO) readings indicative of abstinence, compared to non-contingent vouchers (NV), increased smoking abstinence readings within-treatment, and interacted with motivational interviewing to increase point-prevalence abstinence over a year of follow-up among individuals in treatment for SUD (Rohsenow et al., 2015). It is possible that the provision of a financial incentive for abstinence could create a salient positive expectancy of not smoking (i.e., anticipated financial gain) that would compete with preexisting positive expectancies of smoking and facilitate changes in smoking behavior (i.e., fewer days with smoking, fewer cigarettes/day). Alternatively, if preexisting positive expectancies are reported to be of great

importance, these expectancies may be more salient than temporary financial incentives, and impede change. This study can elucidate expectancy characteristics of those who have the greatest change in smoking behavior following receipt of CV and reveal how CV may interact with smoking expectancies to affect smoking behavior in a sample of smokers with comorbid SUD.

The aim of the current secondary analyses was to investigate the relationship of positive and negative smoking expectancies to smoking behavior during and just after smoking treatment among smokers with SUD assigned to CV-based smoking cessation treatment versus a control condition (NV), on a foundation of counseling. The a priori hypotheses were that greater importance of positive smoking expectancies and lower importance of negative smoking expectancies would predict more smoking in both conditions, but that the effects would be weaker in the CV condition due to monetary reward counteracting the effects of the expectancies. The relationships of the individual expectancy types to smoking outcome were explored without hypothesizing differences among them to identify specific types of expectancies with stronger relationships to smoking.

2. Material and methods

2.1. Participants

Participants were cigarette smokers with SUD (N = 184) in a residential (i.e., 24 h/day) treatment program for SUD who consented to participate in a clinical trial aimed at motivating people with SUD to quit smoking (Rohsenow et al., 2015). Participants did not need to be motivated to quit smoking to enroll. Inclusion criteria included being ≥ 18 years old, meeting DSM-IV diagnostic criteria for SUD, and smoking ≥ 10 cigarettes per day for the past 6 months. Exclusion criteria were current smoking cessation treatment, psychosis, current suicidality, terminal illness, or inability to read or understand informed consent. Smoking was allowed outside the treatment facility during program breaks. Smoking cessation was not addressed by the program directly, and staff at the facility were supportive of the smoking intervention research.

2.2. Study design and procedures

Participants were recruited to participate in the study during their first week in the treatment facility. Eligible and interested participants completed informed consent and baseline assessment. Afterward, they were urn randomized to one of four groups in a 2×2 between-groups factorial design: CV vs. NV and motivational interviewing (MI) vs. brief advice (BA) to quit smoking.

2.3. Intervention procedures

2.3.1. Voucher procedures

Participants were randomized to 19 consecutive days of either CV or NV. In CV, the voucher period included a 5-day reduction phase followed by a 14-day abstinence phase. During the reduction phase, CV participants could earn vouchers for exhaled CO levels (measured once each morning) indicating reductions in smoking relative to baseline (\$2 per reading for a 25% reduction, \$4 for 50% reduction, and \$6 for a 75% or greater reduction). During the abstinence phase, CV participants earned vouchers for each of two daily (morning and evening) CO readings ≤ 6 ppm. The value of each voucher ranged from \$3 to \$16.50 and increased on an escalating schedule for consecutive abstinent readings. When individuals missed a CO reading or provided a CO reading > 6 ppm, the voucher value was reset to the lowest value, but was reset to the highest previously-achieved value after three consecutive CO readings ≤ 6 ppm. NV participants could earn the same payments per day as CV participants for providing breath samples, regardless of CO level, on the same schedule. The total possible amount

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