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Intolerance for withdrawal discomfort and motivation predict voucher-based smoking treatment outcomes for smokers with substance use disorders

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HIGHLIGHTS

- Withdrawal Intolerance and nicotine dependence predicted smoking during treatment.
- Motivation to quit smoking predicted abstinence at 1 month.
- Withdrawal Intolerance, covarying tobacco dependence, predicted smoking at 3 months.
- Treatments should help smokers mitigate or tolerate the discomfort of abstinence.

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ABSTRACT

Identifying predictors of abstinence with voucher-based treatment is important for improving its efficacy. Smokers with substance use disorders have very low smoking cessation rates so identifying predictors of smoking treatment response is particularly important for these difficult-to-treat smokers. Intolerance for Smoking Abstinence Discomfort (IDQ-S), motivation to quit smoking, nicotine dependence severity (FTND), and cigarettes per day were examined as predictors of smoking abstinence during and after voucher-based smoking treatment with motivational counseling. We also investigated the relationship between IDQ-S and motivation to quit smoking. Smokers in residential substance treatment ($n = 184$) were provided 14 days of vouchers for complete smoking abstinence (CV) after a 5-day smoking reduction lead-in period or vouchers not contingent on abstinence. Carbon monoxide readings indicated about 25% of days abstinent during the 14 days of vouchers for abstinence in the CV group; only 3–4% of all participants were abstinent at follow-ups. The IDQ-S Withdrawal Intolerance scale and FTND each significantly predicted fewer abstinent days during voucher treatment; FTND was nonsignificant when controlling for variance shared with withdrawal intolerance. The one significant predictor of 1-month abstinence was pretreatment motivation to quit smoking, becoming marginal ($p < .06$) when controlling for FTND. Lower withdrawal intolerance significantly predicted 3 month abstinence when controlling for FTND. Higher withdrawal intolerance pretreatment correlated with less motivation to quit smoking. Implications for voucher-based treatment include the importance of focusing on reducing these expectancies of anticipated smoking withdrawal discomfort, increasing tolerance for abstinence discomfort, and increasing motivation.

1. Introduction

1.1. Rationale for the study

The ability to predict smoking relapse after an initial quit attempt can provide guidance to theories of addiction, to medications development, and to developing better approaches to smoking cessation counseling. The majority of smoking quit attempts do not lead to lasting tobacco abstinence (Fiore et al., 2008). While the aversiveness of

Abbreviations: BA, brief advice; CV, contingent vouchers; CO, expired carbon monoxide; FTND, Fagerström Test for Nicotine Dependence; IDQ-S, Intolerance for Discomfort Questionnaire–Smoking; M, mean; MI, motivational interviewing; NCV, noncontingent vouchers; PVAMC, Providence Veterans Affairs Medical Center; SD, standard deviation; SUD, substance use disorders.

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tobacco withdrawal plays a role in relapse (Hughes, 2007), individual differences in ability to tolerate or cope with the withdrawal and other stressors from abstinence are also likely to affect success of a smoking quit attempt since some smokers seem better able to endure abstinence distress stoically or to rationalize that the discomforts from abstinence are worth the gains (Sirota, Rohsenow, Dolan, Martin, & Kahler, 2013). Beliefs or expectancies, while smoking, about one's inability to tolerate withdrawal when abstinent from smoking may lead to a decision not to become abstinent.

A related but not identical construct, the ability to tolerate distress or anxiety in general, has been investigated as a correlate of smoking history and as a predictor of smoking treatment response (Brandon et al., 2003; Brown, Lejuez, Kahler, & Strong, 2002; Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005; Brown et al., 2009; Hajek, 1991; Hajek, Belcher, & Stapleton, 1987). This construct has been assessed with persistence on breath-holding or cold pressor tasks (Hajek et al., 1987; Kahler, McHugh, Metrik, Spillane, & Rohsenow, 2013; Sirota et al., 2013), persistence with emotionally stressful tasks (e.g., Quinn, Brandon, & Copeland, 1996), and questionnaires of ability to tolerate anxiety (Zvolensky et al., 2006), feeling distressed or upset in general (Simons & Gaher, 2005) or physical discomfort in general (Schmidt, Richey, & Fitzpatrick, 2006). The behavioral persistence tasks may be reasonable indicators of willingness to persist with the physical or emotional discomfort of smoking cessation but may not be easily used in clinical settings as part of a busy clinical practice. The questionnaires assessing tolerance of various negative emotions or physical discomfort are relevant to ability to tolerate emotional and physical smoking relapse precipitants, but these measures do not assess the specific set of physical, affective, and craving symptoms that occur during acute tobacco abstinence. Anxiety itself is only one of the eight or nine nicotine withdrawal symptoms found to be valid (Hughes, 2007; Hughes & Hatsukami, 1998; Hughes et al., 1999) and may be less relevant to smokers more bothered by craving, depression, anger, fatigue, difficulty concentrating, or other sequelae of abstinence.

The Intolerance for Smoking Abstinence Discomfort Questionnaire (IDQ-S) was designed to specifically assess the ability to tolerate the acute discomforts of recent smoking abstinence (Sirota et al., 2010). A large pool of items was reduced empirically; the two final subscales derived from principal components analysis, Withdrawal Intolerance and Lack of Cognitive Coping, were found to be reliable and valid, with only 2–7% of variance in common (Sirota et al., 2010). Only 7–25% of variance in the Withdrawal Intolerance scale was shared with nicotine dependence severity and 4% with nicotine withdrawal severity after overnight abstinence (Kahler et al., 2013; Sirota et al., 2013, 2010). In a direct comparison of the IDQ-S with three laboratory measures of physical and emotional distress tolerance and an anxiety sensitivity questionnaire, only the IDQ-S showed a consistent relationship to smoking dependence and rate measures and to number of past smoking quit attempts, suggesting it might also be a predictor of outcome (Sirota et al., 2013). Withdrawal intolerance was more strongly related to measures of smoking dependence and cigarettes per day, while lack of cognitive coping was more strongly related to number of past quit attempts, with none of the other measures of more general tolerance for discomfort being significant. In a laboratory analog study of smoking lapse in which participants received cash reinforcement for delaying smoking, breath-holding persistence, but not IDQ-S score, predicted longer latency to smoking after controlling for nicotine dependence and withdrawal symptoms (Kahler et al., 2013). However, the IDQ-S has not yet been examined as a prospective predictor of tobacco abstinence during or after smoking treatment.

1.2. Goals, aims, and hypotheses

Finding predictors of abstinence during voucher-based treatment is particularly important for suggesting way to strengthen the effectiveness of these approaches. Smokers with substance use disorders (SUD) have very low smoking cessation rates so identifying pretreatment predictors of smoking treatment response is particularly important for these difficult-to-treat smokers. The primary aim of the present study was to investigate the ability of the two IDQ-S scales to predict abstinence from smoking during and after treatment with abstinence-contingent vouchers and motivational counseling for smokers in treatment for SUD. In addition, a standard measure of nicotine dependence severity and cigarettes per day pretreatment were also compared as predictors. The other primary aim was to replicate our previous finding that motivation as measured by the Contemplation Ladder predicted 1 and 3 month abstinence outcomes more strongly than pretreatment nicotine dependence severity or number of cigarettes (Rohsenow, Martin, Tidey, Monti, & Colby, 20013) and compare motivation to IDQ-S as a predictor. The primary hypotheses were that smokers with more motivation to quit smoking or less self-reported ability to tolerate the discomfort of smoking abstinence would have less abstinence from smoking at each time point. Since the IDQ-S Lack of Cognitive Coping subscale had a stronger relationship to number of past quit attempts than did other measures (Sirota et al., 2013), we hypothesized that this IDQ-S scale would be a stronger predictor of low rates of smoking abstinence during and after treatment than the Withdrawal Intolerance scale. We also reran analyses controlling for nicotine dependence severity to determine the incremental contribution of the other predictors since nicotine dependence severity is considered the "gold standard" predictor. Secondarily, we investigated the hypothesis that the IDQ-S scales would inversely correlate with a pretreatment motivation to change smoking, a question not investigated previously.

2. Methods

2.1. Participants

Participants were 184 smokers recruited from a 28-day inner-city residential substance treatment program for a study of contingent vouchers plus counseling on smoking abstinence (Rohsenow et al., submitted for publication). Participants did not need to want to quit smoking to be recruited. Participants had to be at least 18 years old, have substance abuse or dependence (see 2.2.1), and have smoked 10 or more cigarettes per day for at least 6 months and not be engaged in any other smoking treatment. Patients were excluded for active psychosis (i.e., hallucinating or delusional), being actively suicidal, terminal illness, or unable to understand informed consent. The 30-patient residential program was abstinence-oriented and provided group substance education based on 12-Step models, with outpatient aftercare available. Detoxification was conducted elsewhere so no patients were in substance withdrawal. Smoking cessation was not addressed by the program but staff supported our efforts, and smoking was allowed outdoors at breaks.

2.2. Procedures

After providing informed content and completing pretreatment assessment that included two baseline breath carbon monoxide (CO) readings (collected using a Bedfont Micro Smokerlyzer®), participants were randomized to 19 days of contingent vouchers (CV) versus non-contingent vouchers (NCV), and to 4 sessions of Brief Advice to quit smoking (BA) versus Motivational Interviewing (MI) over the 19 days of vouchers. Both counseling methods were manualized motivational approaches adapted to address sobriety issues (see Rohsenow et al., submitted for publication, for full description and outcome). Participants were told not to use pharmacotherapy for smoking during the voucher period (to avoid confounds with differential medication use), but free nicotine replacement (patch or gum) was available on request afterwards.

In CV, the voucher period began with a 5-day lead-in period during which vouchers could be earned for reductions from baseline in CO