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Short communication

## Reinforcement expectations explain the relationship between depressive history and smoking status in college students

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### Abstract

Little is understood about biobehavioral mechanisms that mediate the comorbidity between cigarette smoking and depression. We hypothesized that expectancies about nicotine's reinforcing effects are associated with vulnerability to depression, and may partially explain the relationship between history of depression and smoking. Young adult smokers and never smokers ( $N=175$ , mean age=19.9 years, S.D.=3.2) were assessed for history of depression and expectations about the negative (e.g., dispels bad moods) and positive (e.g., increases pleasure) reinforcing effects of smoking. Results are inconsistent with the premise that negative reinforcement expectancies mediate the comorbidity between depression and nicotine dependence. Instead, findings suggest that young adults with a prior history of major depression hold exaggerated expectations about nicotine's positive effects, which could enhance their likelihood of initiating smoking.

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*Keywords:* Tobacco smoking; Depression; Expectations

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## 1. Positive but not negative reinforcement expectations mediate the influence of depressive history on smoking status in a college-student population

Nicotine dependence and depression appear to be inherently connected among a large portion of cigarette smokers. However, little is known about behavioral mechanisms that may cause nicotine dependence among individuals prone to depression. Outcome expectations about nicotine's putative mood-altering effects are a possible mechanism explaining the influence of depression proneness on the smoking behavior of young college-aged students. According to expectancy theories (e.g., Bandura, 1977), outcome expectations are beliefs about the behavioral, cognitive, and emotional products resulting from a certain behavior, like cigarette smoking.

Most work investigating outcome expectations' influence on substance use has concerned alcohol consumption (e.g., Sher, Wood, Wood, & Raskin, 1996). Few studies examine how drug-effect expectations influence cigarette smoking among the affectively vulnerable. At best, smoking rates among older adults prone to negative affect are related to expectations about the negative mood-reducing effects of nicotine (Copeland, Brandon, & Quinn, 1995). It is unclear whether a similar relationship characterizes affectively vulnerable young people. The present study tested whether reinforcement-outcome expectations about smoking would mediate the association between cigarette smoking and depressive vulnerability (Hx+).

## 2. Methods

### 2.1. Participants

Undergraduate psychology students (117 women and 58 men) participated in the present study to fulfill course requirements. There were no inclusion and exclusion criteria. Participants were classified as nonsmokers ( $n=90$ ) or as current smokers ( $n=85$ ). On average, smokers reported smoking cigarettes 5.48 (S.D.=1.98) days per week. Among smokers, 39.3% smoked less than 5 cigarettes daily, 33.3% smoked 5–10 cigarettes, 16.7% smoked 11–20 cigarettes, and 8.3% smoked more than a pack. Twenty percent (35 of 175) of the entire sample reported experiencing at least one past major depressive episode. Among the depression-prone participants, there were 9 never smokers and 26 smokers.

### 2.2. Measures

Participants were classified as *smokers* if they reported currently or formerly smoking cigarettes on a regular basis. Participants were classified as *never smokers* if they had never smoked cigarettes. Current depression and past episodes with depression were measured using the Inventory to Diagnose Depression-Present State Version (IDD; Zimmerman & Coryell, 1988) and Inventory to Diagnose Depression-Lifetime Version (IDDL; Zimmerman & Coryell, 1987). Finally, the Smoking Consequences Questionnaire (SCQ; Brandon &

Baker, 1991) was used to evaluate negative and positive reinforcement expectations about smoking.

### 2.3. Procedures

Potential participants signed up for assessment sessions that were held weekly in groups of 15 to 20. Informed consent was obtained prior to participants' completing the study questionnaire packet. No identifiable information appeared on the study questionnaire packet.

## 3. Results

Gender, ethnicity, and current depression were entered as covariates in the following hierarchical logistic regression analyses. Results showed that Hx+ participants were 5.58 times as likely to be current smokers than those lacking history of depression, Wald = 12.99,  $P = .00$ , OR = 5.8. Positive, but not negative, reinforcement expectations about smoking fully mediated the relationship between Hx+ and smoking status. Results showed that Hx+ significantly predicted positive reinforcement-outcome expectations,  $R^2$  change = .11,  $\hat{\alpha} = .35$ ,  $F(1,164) = 22.47$ ,  $P = .00$ . Further mediation analyses showed that positive reinforcement expectations (Wald = 49.67,  $P = .00$ , OR = 2.44) and not Hx+ (Wald = 2.21,  $P = .14$ , OR = 2.44) predicted smoking status, when both predictor variables were entered on the same regression step.

## 4. Discussion

There is great need to understand factors that contribute to the increasing number of young people who initiate, experiment, and/or smoke cigarettes on a regular basis. Our data are consistent with the possibility that prior experience with major depression predisposes young adults to smoke cigarettes, although the alternative that smoking facilitates depression onset cannot be ruled out. Although negative reinforcement expectations may play some role in initiating smoking, our data suggest that for depression-prone college students, expectations about positive reinforcement are more powerful mediators.

Plausibly, our findings suggest that depression proneness heightens a young person's susceptibility to the rewarding effect of smoking. The tendency of depression-prone young people to be isolated, withdrawn, and introverted (Kashani, Rosenberg, & Reid, 1989) may make nicotine's ability to increase social affiliation highly appealing (Fergusson, Kynskey, & Horwood, 1995). As such, smoking might bring a depression-prone young person out of his or her shell during a stage of life when social influences are particularly important. Alternatively, diminished pleasure (i.e., anhedonia) associated with depression proneness may also propel young vulnerable individuals to smoke cigarettes to increase their pleasurable experiences.

The current study has several limitations that temper interpretation of the results. It is unclear whether the results represent a phenomenon that can be expected to generalize beyond the young adult population. Although the IDD scales showed good construct validity against a semistructured interview like the DIS (Zimmerman & Coryell, 1987), caution should also be exercised regarding the use of self-report questionnaires to diagnose depressive episodes. Finally, the study's cross-sectional, correlational design precludes the ability to infer causal relationships. Findings need to be replicated via experimental, prospective research.

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