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## Addictive Behaviors



Short communication

## Negative affect, stress, and smoking in college students: Unique associations independent of alcohol and marijuana use

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## ABSTRACT

**Introduction:** Stress and negative affect (NA) figure prominently in theoretical models of smoking initiation, maintenance and relapse, yet few studies have examined these associations among college students. Further complicating examination of these associations, smoking often occurs in the context of other substance use (e.g., alcohol, marijuana) in college populations. Thus, it remains unclear whether stress and NA are associated with cigarette use among college students, and if so, whether these associations are evident after controlling for effects of other substance use. The goals of this study were: a) to examine whether several aspects of stress (objective events, subjective experiences) and NA (sad mood, general emotional distress) were associated with cigarette smoking among college students and b) whether associations remained after accounting for alcohol and marijuana use.

**Sample:** A large sample of college freshmen ( $N=633$ ) followed longitudinally over 35 weeks via internet assessments.

**Results:** Results of hierarchical linear modeling demonstrated that measures of subjective stress and NA were positively related to cigarette use, whereas measures of objective stressful events were negatively related to cigarette use. When alcohol and marijuana use were added to the models, associations between smoking and stress/NA were diminished. Associations between NA and smoking remained significant; however, associations between subjective stress/stressful events and smoking were no longer significant.

**Conclusions:** This is the first study to comprehensively examine links between subjective and objective measures of stress and smoking behavior among college students while also considering the influence of other substance use. Negative affect was the most robust correlate of smoking among college students. Subjective and objective stress do not appear to be strongly associated with college smoking above and beyond alcohol and marijuana use. Stress may not be an important etiological factor for relatively low levels of cigarette use among college students. Given that relations between NA/stress and cigarette smoking were diminished when concurrent alcohol and marijuana use was considered, it is imperative for future studies of college students to consider other substance use.

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### 1. Introduction

Cigarette smoking remains a major public concern among college students (Johnston, O'Malley, Bachman, & Schulenberg, 2005). Negative affect (NA) and stress figure prominently in several theories of cigarette use (see Kassel, Stroud, & Paronis, 2003 for review), but few studies have examined these correlates in college samples (e.g., Naquin & Gilbert, 1996; Piasecki, Richardson, & Smith, 2007). Naquin and Gilbert (1996) found that college students who were current smokers reported higher levels of perceived stress compared to students who did not smoke. Furthermore, Piasecki et al. (2007) reported that daily compared to non-

daily college smokers were more likely to cite coping with negative affect as a reason for smoking. Nichter, Nichter, Carkoglu, and TERN members (2007) found that smoking to alleviate distress was a common motivation for college smokers, and that smoking cigarettes was viewed as a nonverbal signal of stress, presumably with the goal of obtaining social support. All of these studies support links between stress/NA and smoking. However, college smoking often occurs in the context of other substance use (Weitzman & Chen, 2005), and this presents a challenge for studies of college smoking because use of other drugs (e.g., alcohol, marijuana) has also been linked to NA and stress (Degenhardt, Hall, & Lynskey, 2003; Swendsen et al., 2000). Prior studies have not adequately addressed this issue, and thus, it is unclear if NA and stress are uniquely associated with college cigarette smoking above and beyond other substance use. This is an important question because prior associations

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between stress/NA and college smoking may be spurious and simply a function of the association between smoking and other drug use.

Our goal was to examine the associations between NA, stress (both subjective experiences and objective events), and cigarette smoking in a sample of college students. We hypothesized that high levels of stress and NA would be associated with increased likelihood of smoking and that these associations would be weakened after controlling for alcohol and marijuana use.

## 2. Method

### 2.1. Study design and participants

Data were part of a larger study of college smoking (see [Colder et al., 2006](#) for details on recruitment and methodology). The study included self-reported cigarette, alcohol, and marijuana use collected weekly via the internet over the course of the freshman year (35 weeks yielding 35 assessment points). To be eligible for the study, students had to have smoked at least one cigarette in their lifetime or had at least one puff of a cigarette in the past year. For the current analysis we selected 633 of the 912 freshmen in the larger study who had smoked at least once during the 35 weeks of the study. The sample was approximately evenly split between males (53%) and females (47%). Average number of cigarettes smoked per day was 3.7 cigarettes (ranging from 0 to 66 cigarettes per day). On average, students smoked on 39 days (ranging from 1 to 244 days) during their freshman year.

### 2.2. Measures

#### 2.2.1. Negative affect

NA was assessed weekly using two measures. The first measure included 5 items from the Center for Epidemiological Studies – Depression Scale (CES-D; [Radloff, 1977](#)) that assess sad mood. Items were averaged to create a mean score for each participant for each of the 35 weeks. The second measure included seven items that assessed general emotional distress (e.g., anger, boredom, frustration, irritability, and sadness) taken from the circumplex model of affect ([Russell, 1980](#)). Items were averaged to create a mean score for each participant for each of the 35 weeks.

#### 2.2.2. Stress

Stress was assessed using three measures. First, general perceived stress was assessed using the Perceived Stress Scale (PSS; 4 items; e.g., “I was unable to control things in my life”; [Cohen & Williamson, 1988](#)). The four items were averaged to create a score for each of the 35 weeks of the study. Second, 14 stressful event items were selected from [Gable, Reis, and Elliot \(2000\)](#) and augmented with items from [Towbes and Cohen \(1996\)](#) and [Zautra, Guarnaccia, and Dohrenwend \(1986\)](#) to represent objective stressful events relevant for college students. These items included a dichotomous (Yes/No) assessment of social (e.g., “I had a disagreement or conflict with a friend/family member/roommate”) and academic (e.g., “I did poorly or worse than expected on a school or work task”) events and were administered monthly. Items were summed to form separate scores reflecting objective social and academic stress for each month. When one of the stressful events was endorsed, participants rated the stressfulness of the event. These ratings were averaged to form subjective measures of social and academic stress for each month.

#### 2.2.3. Substance use

Cigarette, alcohol, and marijuana use were assessed weekly via a web based survey. Each week respondents reported whether or not they drank alcohol, smoked cigarettes, or smoked marijuana in the past week. If they endorsed use, then they reported the quantity of consumption each day in the past week using a weekly calendar. Use during each day was summed to form a weekly quantity of consumption for alcohol, cigarettes, and marijuana. Cigarette use was

**Table 1**

Relations between predictor variables and cigarette use with and without alcohol and marijuana use as control variables.

	Model set 1: cigarette use	Model set 2: cigarette use controlling for alcohol and marijuana use
Depression (CES-D)	$t = 4.25^{**}$ (ES = 0.17)	$t = 2.67^{**}$ (ES = 0.11)
Negative affect (circumplex)	$t = 2.92^{**}$ (ES = 0.12)	$t = 2.53^*$ (ES = 0.10)
General perceived stress (Cohen)	$t = 3.55^{**}$ (ES = 0.14)	$t = -0.16$ (ES = 0.00)
Objective stressful social events	$t = -5.69^{**}$ (ES = 0.22)	$t = -1.73$ (ES = 0.07)
Objective stressful academic events	$t = -5.49^{**}$ (ES = 0.21)	$t = -1.8$ (ES = 0.07)
Subjective stress ratings social	$t = 2.99^{**}$ (ES = 0.12)	$t = 2.13^*$ (ES = 0.08)
Subjective stress ratings academic	$t = 3.39^{**}$ (ES = 0.13)	$t = 0.07$ (ES = 0.00)

Note:  $^{**}p < 0.01$ ;  $^*p < 0.05$ . ES = effect size  $r$  (small,  $r = 0.10$ ; medium,  $r = 0.30$ ; large,  $r = 0.50$ ; Cohen, 1988).

significantly skewed because of the relatively low rate of smoking in the sample, and accordingly, it was dichotomized (Yes/No) for analysis creating 35 dichotomous smoking variables.

### 2.3. Statistical analyses and results

Two sets of logistic hierarchical linear models were estimated.<sup>1</sup> In the first set of models, each predictor (i.e., NA, general perceived stress, objective stressful events, and subjective stress ratings) was entered individually into the model with cigarette use as the outcome, thus producing six models. In the second set of models, alcohol and marijuana use were added as control variables. Results are summarized in [Table 1](#). In the first set of models, measures of perceived and subjective stress as well as both measures of NA were significantly positively related to cigarette smoking, whereas the objective measures of academic and social stressful events had significant negative associations with cigarette use. In the second set of models (after controlling for alcohol and marijuana use), only the two measures of NA and one measure of stress, subjective social stress ratings, were significantly related to cigarette use. Statistically significant associations in the models were equivalent to small effect sizes.

## 3. Discussion

This is the first study to investigate the relations between NA, stress, and smoking among college students, while controlling for alcohol and marijuana use. The study was comprehensive in that we examined objective and subjective indices of stress, and two dimensions of NA (general distress and sadness), and included a large sample that was assessed multiple times during the academic year. Consistent with previous research, measures of depression, general emotional distress, general perceived stress, and subjective stress ratings were positively related to weekly cigarette use, with the strongest association between depression and smoking ([Kassel, 2000](#); [Naquin & Gilbert, 1996](#)). Interestingly, objective stressful events (both social and academic) were negatively related to cigarette use. The latter finding may appear counterintuitive at first, but it is important to note that prior research suggests that smoking is primarily a social activity in college ([Nichter et al., 2007](#)). Perhaps students withdraw when experiencing social (e.g., fight with a friend) or academic stress (e.g., poor grade on a test), thus limiting exposure to contexts where

<sup>1</sup> Gender moderation was tested in all of the abovementioned models and no significant effects were found.

substance use normally occurs in college, such as parties (Piasecki et al., 2007).

When we controlled for alcohol and marijuana use, all of the associations between the predictor variables and smoking diminished, and a number of relationships were no longer statistically significant, including the associations between social and academic stressful events and smoking. Interestingly, both measures of NA were still significantly related to cigarette use after controlling for alcohol and marijuana use. Cigarettes, alcohol, and marijuana all tend to be consumed during parties and social encounters in college (Bell et al., 2008; Wood et al., 2001), and the unique associations between NA and smoking may suggest that NA motivated smoking may occur in different contexts that do not involve other drug use. On some occasions, smoking may signal the desire to be alone (Nichter et al., 2007), and may indicate sad mood or depression (Nichter et al., 2006). That is, when upset, some college students may withdraw and engage in smoking as a solitary activity that does not involve other drug use.

In sum, all measures of stress and NA were significantly related to smoking; however, only the relations between NA and smoking were robust and relatively unaffected by controlling for other substance use. These results are consistent with the self-medication theory of smoking (Ikard et al., 1969) and indicate that NA (rather than objective and subjective measures of stress) is a proximal predictor of college smoking above and beyond the partying atmosphere of college.

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