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Cigarette Smoking Initiation During College Predicts Future Alcohol Involvement: A Matched-Samples Study

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ABSTRACT. Objective: Little is known about the relationship between cigarette smoking initiation and subsequent alcohol involvement. To address this question, the present study compared alcohol use between students who initiated smoking during college and a matched sample of never-smoking students. We hypothesized greater increases in alcohol involvement among smoking initiators, mediated by exposure to cigarette use situations. **Method:** Included in the present study were 104 Chinese American and Korean American undergraduates who at baseline (freshman year) reported never having smoked a cigarette. Subjects were drawn from 433 participants in a naturalistic longitudinal study of tobacco use who were assessed annually each year in college. Cigarette smoking status was assessed annually as part of a structured interview. Initiators and never-smokers were matched on gender, ethnicity, baseline alcohol use, parental smoking status, and behavioral undercontrol.

Results: As predicted, participants who initiated smoking during college reported significantly greater increases in the number of past-30-day total drinks consumed ($p < .001$) and reported greater prevalence of heavy drinking episodes ($p < .05$). The effect of smoking initiation on the change in the number of past-30-day drinks at the final assessment was partially mediated by exposure to smoking ($p < .05$). Exploratory analyses indicated that greater recent smoking significantly predicted increased alcohol consumption over and above the effect of exposure. **Conclusions:** Students who initiate smoking during college appear at risk for increased alcohol involvement. Part of this risk is explained by environmental contextual factors, specifically exposure to situations involving other smokers that also may result in greater exposure to alcohol use. (*J. Stud. Alcohol Drugs*, 74, 909–916, 2013)

EMERGING EVIDENCE INDICATES that cigarette smoking initiation is common among college students. Initial studies addressing this issue found that approximately 11% of college students smoked their first cigarette after age 18 or following college enrollment (Everett et al., 1999; Wechsler et al., 1998; Wetter et al., 2004). More recent prospective research suggests substantially higher smoking initiation during the college years, with 18%–25% of students who had not previously smoked reporting cigarette smoking within their first 2 years in college (Costa et al., 2007; Doran et al., 2012; Tercyak et al., 2007). Substantial initiation also appears to occur among students from ethnic groups with low smoking rates, as suggested by a longitudinal study of Asian American college students in which 25% of those who had not smoked before entering college initiated smoking before the end of their fourth year in college (Myers et al., 2009). Thus, recent findings indicate that smoking initiation during college is an issue deserving further attention.

Investigations of influences on college smoking reveal alcohol use as the most frequently studied and robust predictor of smoking initiation. These studies provide evidence that alcohol use predicts subsequent smoking initiation (Costa et al., 2007; Myers et al., 2009), predicts increases in smoking following initiation (Saules et al., 2004), and is associated with past-year smoking initiation (Reed et al., 2007, 2010; Staten et al., 2007). Costa and colleagues (2007) found that baseline alcohol use (frequency of intoxication in the past month and consequences from drinking in the past month) was significantly higher among college freshman never-smokers who initiated smoking by a 2-year follow-up than among those who did not initiate smoking. A study of smoking initiation among Korean American and Chinese American college students revealed that those who drank in the 30 days before a freshman-year interview were four times more likely to smoke their first cigarette during college than those who reported no drinking (Myers et al., 2009). Additionally, Saules and colleagues (2004) found that female college students who initiated smoking during college had significantly lower alcohol use at baseline (before initiation) than those who began smoking before college. However, by senior year, alcohol use among those who initiated smoking during college more closely resembled consumption among pre-college smokers. These findings highlight alcohol use as a risk factor for the initiation of cigarette smoking as well as

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cigarette smoking as a risk factor for increased heavy drinking and alcohol-related problems.

The associations between alcohol use and smoking initiation reflect the high concordance of these behaviors. High rates of alcohol use and problematic alcohol use are found among college student smokers, particularly those who smoke on an occasional and nondaily basis (Dierker et al., 2006; Emmons et al., 1998; Krukowski et al., 2005; Weitzman and Chen, 2005). Rates of alcohol use among college student smokers are especially high, with 98% of past-30-day cigarette smokers in the Harvard School of Public Health College Alcohol Study reporting that they had used alcohol in the last year (Weitzman and Chen, 2005). This may be explained by alcohol and tobacco use sharing common risk factors, such as family history of alcoholism, gender, ethnicity, availability, social cues, expectancies, or stress (Bobo and Husten, 2000; Jackson et al., 2010; McKee et al., 2010; Sher et al., 1996), as well as the combined effects of alcohol and tobacco use. For example, experimental studies have shown a cross-substance craving effect with alcohol or tobacco acting as a conditioned cue for the other substance (Burton and Tiffany, 1997; Piasecki et al., 2011). Smokers reported greater subjective effects from the concurrent use of alcohol and tobacco (McKee et al., 2004; Rose et al., 2002), were more likely to report positive reinforcement from smoking while under the influence of alcohol (McKee et al., 2004; Piasecki et al., 2011), and smoked more while drinking (Harrison et al., 2009; McKee et al., 2010).

Young adults frequently use tobacco and alcohol concurrently and report that smoking occurs more frequently on drinking days, smoking increases while drinking, and drinking increases while smoking (Harrison and McKee, 2008; Jackson et al., 2010; Witkiewitz et al., 2012). Jackson and colleagues (2010) found that smoking was 2.75 times more likely to occur for college student smokers on a drinking day than on a nondrinking day. In addition, college students report viewing drinking occasions as "permission" to use cigarettes (Nichter et al., 2010). Context also plays a key role in the use of both alcohol and cigarettes. For example, Colder and colleagues (2006) found that smoking was more likely to occur on weekends among college students, particularly "party weekends," when alcohol use was likely to occur (e.g., Halloween or New Year's Eve).

A recent daily diary study highlighted the role of context in the concurrent use of alcohol and cigarettes, compared with drinking alone. College students were more likely to smoke while drinking when they were at a party or a bar, when they were experiencing greater stress, or when they were consuming greater quantities of alcohol (Witkiewitz et al., 2012). Consistent with previous findings (e.g., Jackson et al., 2010), the authors found that, in contexts that posed increased risk for concurrent use, the consumption of alcohol and cigarettes increased compared with occasions when

either substance was used alone (Witkiewitz et al., 2012). Therefore, the use of either alcohol or cigarettes may increase the use of the other substance, potentially facilitating progression in use or development of dependence, and the context or circumstances in which use occurs may account for a significant portion of the variance in this process.

Although there is strong evidence for an association between alcohol use and cigarette smoking, and some evidence for the role of environmental and contextual factors in the relationship between smoking and drinking, we identified only one study that prospectively examined the relationship between smoking initiation and alcohol use. That comparison of changes in alcohol use between women who were pre-college smokers, college initiators, and non-initiators (Saules et al., 2004) did not control for baseline alcohol use or risk factors that may predispose to greater risk of alcohol and/or cigarette use. Therefore, little is currently known regarding the prospective effects of smoking initiation on subsequent drinking in college students, an issue with important practical and theoretical implications. For example, evidence for such a relationship could serve to motivate greater attention to the prevention of tobacco use on college campuses. Data addressing this issue also could inform research aiming to better understand reciprocal influences of cigarette initiation and progression on alcohol use escalation.

To further elucidate the relationship between smoking initiation and alcohol use, we examined a sample of college students matched on known risk factors for smoking initiation and drinking. Students who did or did not initiate smoking during college were matched on gender, ethnicity, baseline alcohol and other drug use, parental smoking, and behavioral undercontrol (e.g., impulsivity, aggression, and sensation seeking), and then they were compared on changes in alcohol use during their time in college. We hypothesized greater increases in prospective alcohol involvement among students who initiated smoking during college compared with those who never initiated smoking. We additionally predicted that greater exposure to situations or contexts involving cigarettes (and by extension alcohol use) would mediate the relationship between smoking initiation and greater alcohol involvement. In addition, we explored the relationship between cigarette consumption and increases in alcohol use.

Method

Participants

The participants were college students enrolled in a longitudinal study of tobacco use. Students of Chinese or Korean descent at a public university in the southwestern United States were enrolled during their freshman year in college. The full sample consisted of 433 students. Nearly half (48%) were Korean American, 51% were female, and

they were on average 18.1 years of age ($SD = 0.32$) at the time of enrollment.

Procedure

The participants were recruited using flyers and advertisements on campus. The criteria for inclusion were that they be (a) first-year college students, (b) of Chinese or Korean descent, and (c) 18 or 19 years of age. Data were collected during four annual in-person interviews by trained research assistants. The initial interview took place during the participants' freshman year in college, the second interview occurred 15 months later, and the final two interviews occurred at 12-month intervals. The participants were paid for completing each interview.

Measures

Cigarette-smoking status. Cigarette-smoking status was assessed at each interview. Smoking history was assessed at baseline by asking each participant whether he or she had ever smoked more than a puff of a cigarette. Smoking initiation was assessed at each follow-up interview by asking whether the participant had smoked a cigarette since the previous interview. The participants who reported never smoking at the freshman year interview and reported smoking their first cigarette at a subsequent interview were considered initiators. In addition, participants were asked to estimate their lifetime consumption of cigarettes at the fourth-year follow-up interview.

Alcohol use. The Timeline Followback (TLFB) procedure (Sobell and Sobell, 1992) was administered to assess past-90-day alcohol and other drug use at each interview. Alcohol use quantity (the number of standard drinks consumed) was recorded for each day on which drinking was reported. For the present study, TLFB data were computed to provide the total number of drinks consumed in the past 30 days. The 30-day time window was selected to be consistent with National Institute on Alcohol Abuse and Alcoholism (NIAAA) recommendations for assessing alcohol use in underage drinkers (NIAAA, 2003). We elected to report quantity rather than frequency because this measure provides a more direct indicator of overall consumption. Consistent with previous studies, we also computed the number of heavy drinking episodes (HDEs) for the prior 2 weeks (Doran et al., 2007; Wechsler et al., 2000) for the baseline and fourth-year interviews. An HDE was defined as an occasion when a woman consumed four or more drinks and an occasion when a man consumed five or more drinks within a 24-hour period (Wechsler et al., 1995). The TLFB has been shown to have good reliability and validity with college student alcohol use (Sobell et al., 1986).

ALDH2 genotype. Aldehyde dehydrogenase influences the metabolism of alcohol, with variant alleles of the *ALDH2*

genotype (*ALDH2*2*) associated with decreased alcohol consumption and protection from problematic alcohol use (Wall, 2005). Although rare in Whites, the *ALDH2*2* variant is relatively common in individuals of Southeast Asian descent (Chen et al., 1999). Blood samples were submitted for DNA analysis at the Alcohol Research Center at Indiana University. Genotype was ascertained using polymerase chain reaction of DNA and allele-specific oligonucleotide probes (Crabb et al., 1989). Participants were classified as possessing the *ALDH2*1/*1*, *ALDH2*1/*2*, or *ALDH2*2/*2* genotype. Consistent with previous research, the latter two groups were combined, yielding participants with or without a variant allele.

Behavioral undercontrol. Behavioral undercontrol was assessed at baseline using the 20-item Behavioral Undercontrol Questionnaire (Doran et al., 2011). Items were scored on a 4-point Likert-type scale (1 = *true*, 2 = *mostly true*, 3 = *mostly false*, and 4 = *false*). This scale, adapted from the Disinhibition scale of the General Temperament Survey (Stice et al., 1998; Watson and Clark, 1992), measures lack of foresight, delay of gratification, impulsivity, sensation seeking, disorganization, irresponsibility, and unconventionality. Previous research has demonstrated that the scale represents a one-dimensional factor with good psychometric properties (Doran et al., 2011) and is shown to predict substance use (Doran et al., 2007; Myers et al., 2009).

Acculturation. Acculturation was assessed with the Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA; Suinn et al., 1992). The SL-ASIA consists of 21 Likert-scale items that evaluate a range of aspects of acculturation, including language, perceived ethnic identity, and ethnicity of friends, as well as preferences for types of foods, movies, and music. The scale is scored to yield an acculturation score from 1.00 (low acculturation/high Asian identification) to 5.00 (high acculturation/high Western identification). This measure has adequate reliability (Suinn et al., 1987, 1992) and good concurrent validity (Suinn et al., 1992).

Peer and parental smoking. Peer smoking was assessed with a single item asking, "Of the friends you hang out with, how many smoke cigarettes?" with the response recorded as a percentage from 0% to 100%. Smoking was assessed separately for the participants' mother and father ("Does your mother/father smoke cigarettes regularly?"). Each participant was classified as having either smoking parents (one or both parents currently smoking regularly) or nonsmoking parents (both parents having never smoked regularly and/or were ex-smokers).

Exposure to smoking. Participants were asked to rate their exposure to smoking at each time point. Exposure was assessed with a single item reflecting the extent to which participants were exposed to situations where smoking occurred, rated on a scale from 1 to 10. For purposes of the analyses, exposure ratings from the fourth-year time point were used because all initiators had started smoking by that point. This

TABLE 1. Comparison of initiators versus never-smokers on matching variables

Variable	Initiators (<i>n</i> = 52)	Never-smokers (<i>n</i> = 52)	<i>p</i>
Gender, % female (<i>n</i>)	48% (25)	48% (25)	1.0
Ethnicity, % Chinese (<i>n</i>)	64% (33)	64% (33)	1.0
Parental smoking, % yes (<i>n</i>)	23% (12)	21% (11)	.813
Baseline total drinks past 30 days, <i>M</i> (<i>SD</i>)	7.94 (12.12)	7.35 (12.23)	.803
Behavioral Undercontrol Questionnaire score, <i>M</i> (<i>SD</i>)	2.19 (0.29)	2.17 (0.28)	.741

measure was used as a proxy for exposure to situations or contexts involving cigarette and alcohol use.

Analysis plan

Matching. One-to-one matching was performed using procedures described by Abadie and Imbens (2006) as implemented in the R statistical programming language (R Development Core Team, 2009) package Matching (R Development Core Team, 2009; Sekhon, 2011).

Group differences on alcohol outcomes. Differences in alcohol use outcomes were compared using analysis of variance and logistic regression, as appropriate. For any potential predictors of alcohol use that differed between groups following matching, analyses included such variables as covariates. Fourth-year alcohol outcomes that we examined included the total number of drinks consumed in the 30 days before the interview and the presence of an HDE in the 14 days before interview.

Test of mediating effect. To assess whether exposure to smoking at the fourth-year assessment mediated the effects of smoking initiation on the change from baseline to the fourth year in the past-30-day number of drinks and the number of past-14-day HDEs, we used the *ab* product-coefficient method (MacKinnon et al., 2007). This method requires calculating the product of two coefficients: smoking initiation regressed onto the mediator (smoking exposure at fourth year; the *a* path), and that of the mediator regressed onto the dependent variable (total number of drinks and HDE change scores; the *b* path). Unstandardized coeffi-

cients and their standard errors were derived from ordinary least-squares regression models that included acculturation, *ALDH2*, and baseline alcohol consumption or HDE status as covariates. Coefficients and standard errors were then entered into the PRODCLIN2 program (MacKinnon et al., 2007), yielding 95% confidence intervals (CIs) indicating whether the indirect effect was significant (i.e., the confidence interval did not contain 0). The standard error for the indirect effect was calculated using the first-order test (Sobel, 1982).

Results

Matching

Of the full sample at baseline (*N* = 433), 297 reported no previous smoking, and initiation status was ascertained for 267 (30 were lost to follow-up). Thus, matching was performed with 67 initiators and 200 never-smokers. Because of our desire to examine the influence of cigarette initiation on drinking, never-smokers were matched with initiators on variables previously found predictive of or associated with college smoking initiation: gender, ethnicity, baseline alcohol and other drug use, as well as parental smoking status and behavioral undercontrol (Costa et al., 2007; Emmons et al., 1998; Myers et al., 2009; Reed et al., 2007; Tercyak et al., 2007). Exact matching was imposed for the dichotomous variables gender, baseline alcohol use, and baseline other drug use. With these restrictions, we were able to achieve matching for 52 of the 67 initiators, yielding a final sample

TABLE 2. Comparison of initiators versus never-smokers on other potential influences on alcohol use

Variable	Initiators (<i>n</i> = 52)	Never-smokers (<i>n</i> = 52)	<i>p</i>
Baseline heavy drinking episode past 14 days, % yes (<i>n</i>)	23% (12)	21% (11)	.813
<i>ALDH2</i> genotype, % variant (<i>n</i>)	35% (18)	42% (22)	.420
Acculturation, <i>M</i> (<i>SD</i>)	3.01 (0.43)	2.84 (0.49)	.060
Percentage of smoking friends, ^a <i>M</i> (<i>SD</i>) (from 0% to 100%)	14.73 (17.27)	20.50 (28.41)	.214

^aOriginal variable was significantly skewed. Log transformation led to acceptable skewness and kurtosis. Evaluation of group means for transformed variable, *p* = .803. Original variable reported for interpretability.

of 52 matched pairs (Table 1). The fidelity of matching is indicated by a minimum $p = .74$ for comparisons on the matching variables.

Because the procedure used and the small sample size limited the number of matching variables that could be considered, groups were compared on additional variables potentially related to alcohol use progression, including aldehyde dehydrogenase metabolizing enzyme (ALDH2) status and acculturation (Doran et al., 2007), parental alcohol dependence, peer smoking, and baseline past-14-day HDE. Although none of these variables differed significantly across groups in the present study (Table 2), given the small sample size (and therefore limited statistical power), we chose to include ALDH2 ($p = .42$) and acculturation ($p = .06$) as covariates in the primary analyses of alcohol outcomes because these represent ethnic-specific variables that have been associated with alcohol use in other studies (Doran et al., 2007; Hendershot et al., 2005; Luczak et al., 2004).

Outcomes

To assess our hypotheses, we compared the matched groups on change scores for the number of drinks reported in the prior 30 days computed for the difference between baseline and fourth-year data, and on the percentage of participants reporting an HDE in the past 14 days at the freshman and senior-year assessments. The presence or absence of *ALDH2* variant genotypes and acculturation were included as covariates in these analyses. First, an analysis of covariance was conducted to examine the change in alcohol consumption. As predicted, the participants who had initiated smoking during college reported significantly greater increases in total drinks consumed than never-smokers, $F(3, 100) = 7.12, p < .001$; mean change values = 14.7 (19.0) and 0.6 (11.5), respectively. The covariates were not significant predictors of alcohol change scores. Next, we conducted a hierarchical binary logistic regression, with smoking initiation status as a predictor of one or more senior-year HDEs, controlling for baseline HDE, *ALDH2* status, and acculturation. The first step of the model, including the covariates, was significant, $\chi^2(3) = 8.19, p = .042$; however, only baseline HDE significantly predicted senior-year HDE (odds ratio [OR] = 3.22, 95% CI [1.18, 8.80], $p = .023$) such that

participants reporting a baseline HDE were approximately three times more likely to report an HDE at the senior-year interview. The second step of the model, including smoking initiation status, was significant, $\chi^2(1) = 13.71, p < .001$, indicating that initiating smoking was associated with senior-year HDE above and beyond the covariates. Students who initiated smoking during their participation in the study were approximately five times more likely to report an HDE at the senior year interview (OR = 5.43, 95% CI [2.10, 14.10], $p = .001$) than those who did not initiate smoking.

Mediation

Results from the mediational models are shown in Table 3. The *a* (the association between smoking initiation and smoking exposure) and the *b* (the association between smoking exposure and alcohol consumption change scores) paths were significant for both the total number of drinks and HDE outcomes. We found significant indirect effects of smoking initiation on the change in the past-30-day number of drinks ($ab = 3.35, 95\% \text{ CI } [0.87, 6.67]$) and the change in past-2-week number of HDEs ($ab = 1.30, 95\% \text{ CI } [0.36, 2.55]$) at the last assessment, via smoking exposure. These mediating effects accounted for a portion of the effect of smoking initiation on the change in alcohol consumption. However, smoking initiators continued to have significantly more change in the past-30-day number of drinks, $F(1, 98) = 9.18, p = .003$, and in the past-2-week number of HDEs, $F(1, 98) = 8.62, p = .004$, after the mediator was controlled for.

Exploring the relationship between smoking quantity and alcohol use

First, smoking characteristics of the 52 initiators were examined at the fourth-year assessment. Students who initiated smoking reported a total lifetime number of cigarettes smoked ranging from 1 to greater than 998 (the maximum value recorded), with a median of 20. Of the initiators, 17 (32.7%) reported having smoked at least 100 cigarettes in their lifetime, and 18 (34.6%) had smoked in the 30 days before the fourth-year assessment. The 18 current smokers reported an average of 11.89 ($SD = 1.88$) smoking days with

TABLE 3. Indirect effects of smoking initiation on change in alcohol consumption via smoking exposure

Path	Change in 30-day total drinks			Change in 14-day HDE		
	Coef.	SE	[95% CI]	Coef.	SE	[95% CI]
<i>a</i> **	1.06**	0.29	[0.47, 1.65]	1.06**	0.29	[0.47, 1.67]
<i>b</i> **	3.16**	1.11	[0.96, 5.36]	1.22**	0.41	[0.41, 2.04]
<i>ab</i> *	3.35*	1.49	[0.87, 6.67]	1.30*	0.56	[0.36, 2.55]

Notes: Coef. = coefficient; CI = confidence interval.

* $p < .05$; ** $p < .01$.

a mean of 3.64 ($SD = 4.59$) cigarettes per smoking day. Only five initiators were frequent smokers (>20 smoking days per month; Centers for Disease Control and Prevention, 2010) at the senior-year assessment.

Exploratory ordinary least-squares regression models, similar to those used for mediation, were used to examine the relationship between the extent of cigarette smoking and alcohol use beyond the effects of exposure to smoking. Separate regression models were conducted to examine the associations between lifetime and current smoking quantity and alcohol use change scores from baseline to fourth year (the past-30-day total number of drinks and the number of HDEs in the past 14 days). Each regression included *ALDH2* status, acculturation, and senior-year exposure to smoking as covariates. After considering the effect of covariates, the past-30-day total number of cigarettes at the fourth-year assessment significantly predicted change in the past-30-day number of total drinks, $t(1, 98) = 3.19, p = .002$, and the past-14-day number of HDEs, $t(1, 98) = 3.21, p = .002$. Lifetime smoking quantity was not a significant predictor of change in the past-30-day total number of drinks ($p = .316$) or the past-14-day number of HDEs ($p = .147$). As such, greater past-month smoking quantity at the Year 4 assessment was associated with significantly greater increases in the total number of drinks of alcohol and the number of HDEs between baseline and final assessments.

Discussion

The participants in the present study consisted of Chinese American and Korean American college students who were carefully matched on variables predictive of smoking initiation and alcohol use. As hypothesized, students who initiated smoking during college reported significantly greater alcohol involvement at their senior-year interview than did never-smokers. A portion of the relationship between smoking initiation and increased alcohol use was accounted for by self-reported exposure to cigarette smoking, which was used as a proxy for situations involving cigarette and alcohol use. Greater recent cigarette consumption independently accounted for a significant proportion of the increase in alcohol consumption over time.

The smoking-initiation status groups compared in this study did not differ on baseline drinking levels, behavioral undercontrol, prevalence of alcohol dehydrogenase variant alleles (alcohol metabolizing enzymes), or level of acculturation. However, those who initiated smoking during college showed significantly greater increases than never-smokers in the average number of drinks consumed over the past 30 days from freshman to senior year. Initiators also were five times more likely to report an HDE at the senior-year interview than never-smokers. Thus, the successful matching procedure argues that key risk factors for alcohol and cigarette use do not appear to explain the observed findings.

Initial support was provided for the hypothesis that the relationship between smoking initiation and greater alcohol use may reflect increased exposure to smoking and alcohol use contexts. Specifically, it may be that greater exposure to cigarette use situations following initiation corresponded with more frequent exposure to alcohol use, such that smoking initiation may have led to increased drinking through environmental factors that influenced higher levels of drinking. However, exposure to cigarettes only partially explained the relationship between smoking initiation and alcohol use. This may reflect the limited assessment of environmental influences on smoking and drinking in the present study. More thorough and careful assessment of contextual influences is needed to better characterize the mechanisms underlying the observed relationships.

Exploratory analyses examining the relationship between smoking quantity and alcohol use after accounting for the influence of exposure to smoking situations indicated that recent but not lifetime cigarette consumption was linked to heavier drinking. These results are consistent with prior research findings that smoking is associated with increased concurrent drinking (Harrison and McKee, 2008; Jackson et al., 2005; Witkiewitz et al., 2012), a relationship that would be anticipated for recent but not lifetime consumption of cigarettes. This suggests that, in addition to the role of context, other factors suggested by previous studies (e.g., greater subjective effects, enhanced reinforcement, conditioned cues) also may play an important role in the relationship between college student smoking and drinking. The small size and low rates of smoking in the present sample indicate that caution should be exercised in interpreting these findings.

The present study has a few important limitations, including a small and ethnically homogeneous sample and limited assessment of exposure to substance use contexts. The sample composition cautions against generalization to other ethnic groups. However, group comparisons indicated no differences in acculturation and alcohol-metabolizing enzymes, suggesting that key ethnicity-related variables do not explain the observed differences. Other variables known to influence alcohol use by college students, such as alcohol-related expectancies and negative affect or stress, also may account for some of the observed relationships but were not measured in this study.

The limited measurement of context dictates that the present results must be interpreted cautiously. Although the literature supports that cigarettes and alcohol are frequently consumed concurrently by college students (Witkiewitz et al., 2012), future studies with more careful assessment of context and environmental exposure are needed to confirm the proposed mechanism linking cigarette initiation and alcohol use.

The present study indicates that when key risk factors for smoking and alcohol use are controlled for, smoking initiation is prospectively associated with significantly greater

alcohol consumption. Greater exposure to situations involving cigarettes (and presumably alcohol use) at least partially accounts for the relationship between smoking initiation and heavier drinking. In addition, preliminary results indicate that higher levels of recent smoking are positively associated with greater increases in alcohol consumption above and beyond contextual effects. If supported by future research, the present findings imply that the prevention of smoking initiation by college students may reduce subsequent increases in alcohol use. Similarly, efforts to encourage cessation among current cigarette smokers also may have a salutary effect on college student alcohol consumption.

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