



## Integrated smoking cessation and binge drinking intervention for young adults: A pilot efficacy trial



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### HIGHLIGHTS

- An integrated intervention for young adult smokers and binge drinkers was examined.
- Integrated intervention produced greater tobacco abstinence at 6-months.
- Integrated intervention was associated with less binge drinking at 6-months.

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### ABSTRACT

Alcohol consumption is strongly associated with cigarette smoking in young adults. The primary aim of this investigation was to complete a pilot evaluation of the efficacy of an integrated intervention that targets both cigarette smoking and binge drinking on the cigarette smoking and binge behavior of young adults at 6-month follow-up. Participants were 95 young adult ( $M = 24.3$ ;  $SD = 3.5$  years) smokers ( $\geq 1$  cigarettes per day) who binge drink ( $\geq 1$  time per month) and who were randomly assigned to standard treatment ( $n = 47$ ) involving six individual treatment visits plus eight weeks of nicotine patch therapy or the identical smoking cessation treatment integrated with a binge drinking intervention (integrated intervention;  $n = 48$ ). Using an intent-to-treat analysis for tobacco abstinence, at both 3 month end of treatment and 6 month follow-up, more participants who received integrated intervention were biochemically confirmed abstinent from tobacco than those who received standard treatment at 3 months (19% vs. 9%,  $p = 0.06$ ) and 6 months (21% vs. 9%,  $p = 0.05$ ). At 6 months, participants who completed the study and who received integrated intervention consumed fewer drinks per month ( $p < 0.05$ ) and number of binge drinking episodes per month ( $p < 0.05$ ) than those who received standard treatment. Preliminary data supports that integrated intervention enhances smoking cessation and reduces binge drinking compared to standard treatment.

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### 1. Introduction

Cigarette smoking is the single most important preventable cause of morbidity, mortality, and excess health cost in the U.S., accounting for 443,000 premature deaths each year (Centers for Disease Control & Prevention, 2012). Young adults aged 18 to 24 years have a high prevalence of cigarette smoking at 23%. Their patterns of smoking tend to differ considerably from those of older adults with a greater proportion of young adults smoking on a non-daily basis or smoking a low number of

cigarettes per day (Solberg, Boyle, McCarty, Asche, & Thoele, 2007). Despite the high prevalence of smoking in young adults and distinctly different patterns of tobacco use, few intervention trials have been designed specifically for this group. A recent systematic review of the young adult smoking literature identified only 14 prior investigations that evaluated interventions specifically oriented for young adults (Villanti, McKay, Abrams, Holtgrave, & Bowie, 2010). Thus, based on the limited existing literature and the prevalence of the problem, young adults stand to benefit greatly from the development of effective tobacco cessation interventions.

Binge drinking in the U.S. is defined as consumption of  $\geq 5$  standardized alcoholic drinks (i.e., 1 standard drink contains 14 g pure alcohol) in a row for males or  $\geq 4$  drinks in a row for females. The Healthy People 2020 goals established by the U.S. Surgeon General seek to achieve a

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10% reduction in binge drinking by the year 2020. The year 2008 prevalence of binge drinking is the highest among young adults aged 18 to 25 years in comparison to any other age group with a prevalence of 41.0% (Substance Abuse & Mental Health Services Administration, 2009). Also of concern, the prevalence of binge drinking among young adults has remained stable in comparison to the prevalence reported by the prior 2007 survey. In addition to being a risk factor for poor treatment outcome following smoking cessation intervention (Murray, Istvan, Voelker, Rigdon, & Wallace, 1995), numerous adverse health consequences are associated with binge drinking including unintentional accidents or injuries, suicide, interpersonal violence, unintended pregnancy, child neglect, lost productivity, alcohol poisoning, hypertension, acute myocardial infarction, gastritis, pancreatitis, sexually transmitted diseases, meningitis, and uncontrolled diabetes (Naimi et al., 2003).

Considerable evidence suggests that alcohol consumption is strongly associated with cigarette smoking. Among heavy alcohol users aged 12 or older, 58.0% smoked cigarettes in the past month. In contrast, 19.2% of non-binge drinkers and 16.1% of persons who did not drink alcohol in the past month were current smokers (Substance Abuse & Mental Health Services Administration, 2009). Higher levels of alcohol consumption is associated with more severe levels of tobacco dependence and poorer smoking treatment outcomes in adult smokers with current or past alcohol problems (Cook et al., 2012). Finally, although smoking and alcohol use are independent risk factors for cancer and cardiovascular disease, they also interact to synergistically elevate disease risk above the risk posed by use of either of these substances individually (Turati et al., 2013).

We published an earlier investigation (Ames et al., 2010) which serves as the foundation for the current study that developed the experimental integrated intervention approach that is the focus of the present manuscript. Our earlier study found that the integrated intervention was highly acceptable to young adults. More participants who received integrated intervention were biochemically confirmed abstinent from tobacco than those who received standard treatment (36% vs. 21%, Fisher's exact test  $p = 0.28$  at week 12; 23% vs. 11%,  $p = 0.30$  at week 24). Additionally, at week 24 participants who received integrated intervention reported fewer binge drinking episodes compared to those who received standard treatment (treatment effect = 1.4 fewer binge drinking episodes in the last 30 days,  $p = 0.37$  from ANCOVA with number of episodes reported at baseline included as a covariate). Based on this preliminary data, we proceeded with this pilot efficacy trial.

The primary aim of this investigation was to pilot test the efficacy of an integrated intervention that targets both cigarette smoking and binge drinking on the cigarette smoking and binge behavior of young adults at 6-month follow-up. We hypothesized that integrated intervention would be associated with significantly higher biochemically-confirmed 7-day point-prevalence tobacco abstinence rate and fewer binge drinking episodes than standard treatment at 6 month follow-up. The integrated intervention is based on the rationale that decreased smoking and improved maintenance of abstinence would result from a behavioral intervention to reduce binge drinking. This hypothesis is in turn supported by several lines of evidence including conditioning mechanisms in which craving to smoke is elicited by higher levels of alcohol consumption (Burton & Tiffany, 1997; King & Epstein, 2005) and environmental factors such as parental and peer influence for concurrent use of cigarettes while engaging in binge drinking (Hoffman, Welte, & Barnes, 2001). Thus, we also wished to examine the effect of the integrated intervention on several possible mediators of change that correspond to these mediating mechanisms including cravings to smoke, perceived similarity to the typical smoker, and self-efficacy for smoking abstinence. We hypothesized that the integrated intervention would decrease cravings to smoke, decrease perceived similarity to the typical smoker, and increase self-efficacy for smoking abstinence.

## 2. Methods

### 2.1. Participants

This study was approved by the Mayo Clinic Institutional Review Board. Participants included 95 young adult smokers who binge drink. Inclusion criteria included: age 18–30 years, smoked  $\geq 1$  or more cigarettes per day during the past 6 months, and binge drank on  $\geq 1$  occasion per month during the past 3 months. Binge drinking was defined as consumption of  $\geq 5$  standardized alcoholic drinks in a row for males or  $\geq 4$  drinks in a row for females. Exclusion criteria included: current alcohol dependence as assessed by the Structured Clinical Interview for DSM-IV Axis I Disorders, Alcohol Dependence Module (First, Spitzer, Gibbon, & Williams, 2004) or drug dependence as determined by Drug Abuse Screening Test-20 (Skinner, 1982) score of  $\geq 6$ , current clinical depression as indicated by score  $\geq 20$  on Beck Depression Inventory-II (Beck, Steer, & Brown, 1996), current use of nicotine containing medication or tobacco products other than cigarettes, current use of any other smoking cessation treatment involving behavioral or pharmacological interventions, any medical condition that would preclude use of the nicotine patch, and currently pregnant or breast feeding, or likely to become pregnant during the nicotine patch phase.

### 2.2. Procedure

Participants with an interest in quitting smoking were recruited from two study sites in north Florida. Participants were recruited from the general community, local college campuses, and local businesses via active (i.e., intercept sampling) and passive methods (i.e., advertisements in college newspapers and city wide publications targeted to young adults). Intercept sampling consisted of young adult research assistants approaching young adults in public places that were observed to be smoking and asking them if they would be interested in learning about participation in our smoking cessation study. Interested individuals were provided with a flyer with the study contact telephone number and asked to call to complete screening.

This study employed a randomized, two-group design with repeated assessments at baseline, end-of-treatment (week 12), and end-of-study (week 24). Participants were paid \$270 for their completion of assessments. Blocked randomization stratified according to gender was used. Following the baseline assessment, participants were randomized to one of two treatment conditions: 1) a 6 session individual behaviorally-based smoking cessation intervention plus 8 weeks of nicotine patch therapy (i.e., standard treatment), or 2) the identical smoking cessation treatment integrated with a binge drinking intervention (i.e., integrated intervention). Treatment conditions were matched for total contact time and the same nicotine patch therapy treatment protocol was used in each condition according to the participant's level of cigarette smoking. Participants smoking 10 or more cigarettes per day were treated with 21 mg/24 h for 4 weeks, 14 mg/24 h for 2 weeks, and 7 mg/24 h for 2 weeks. Participants smoking 9 or fewer cigarettes per day were treated with 14 mg/24 h for 6 weeks and 7 mg/24 h for 2 weeks. The target quit date for all participants was set for the day of the week 4 treatment visit and nicotine replacement therapy was initiated on this day for all participants.

Both treatments were manualized and master's degree level research coordinators who had received training from the principal investigator on smoking cessation intervention delivered both treatment conditions. A second study coordinator, who was blinded to participant treatment condition assignment, was responsible for completion of all assessments. All treatment sessions were audio recorded and 25% of the sessions were reviewed in their entirety by the principal investigator and corrective feedback was given to the research counselor as needed to ensure fidelity and discriminability of treatment delivery. Fidelity of receipt of the interventions by participants was assessed at the end of each treatment visit and corrective feedback provided as

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