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Marijuana Use and Tobacco Smoking Cessation Among Heavy Alcohol Drinkers

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Abstract

Background—Whereas problem drinking impedes smoking cessation, less is known whether marijuana use affects smoking cessation outcomes and whether smoking cessation treatment leads to changes in marijuana smoking.

Methods—In a randomized clinical trial that recruited 236 heavy drinkers seeking smoking cessation treatment, we examined whether current marijuana smokers ($n = 57$) differed from the rest of the sample in tobacco smoking and alcohol use outcomes and whether the patterns of marijuana use changed during treatment.

Results—Half of the marijuana users reported smoking marijuana at least weekly (an average of 42% of possible smoking days), the other half used infrequently, an average of 5% of possible days. There were no significant differences between the marijuana use groups and non-users on smoking outcomes and marijuana use did not predict smoking lapses. All participants made large reductions in weekly alcohol consumption during the trial, with weekly marijuana users reducing their drinking by 47% and at a faster rate than non-marijuana users after the 8-week follow-up. Weekly marijuana smokers also steadily decreased their marijuana use over the course of the study (at 8-, 16-, and 26-week follow-ups) by more than 24%.

Conclusions—These data suggest that frequent marijuana smokers may benefit from smoking cessation interventions, even when marijuana use is not explicitly discussed. These individuals do not show any more difficulty than other cigarette smokers in making efforts to reduce tobacco smoking and in fact, make meaningful changes in marijuana use and heavy drinking. Future clinical trials should examine whether smoking cessation treatment that addresses both marijuana and tobacco smoking leads to substantial reductions in marijuana use.

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Keywords

marijuana; tobacco; alcohol; smoking cessation treatment

1. Introduction

Current cigarette smokers are nearly four times more likely to use marijuana than non-smokers (Bell et al., 1997), and current marijuana users are five to seven times more likely than non-users to smoke tobacco (Mohler-Kuo et al., 2003; Richter et al., 2004). In addition, heavy drinking is prevalent among both cigarette (Chiolero et al., 2006; Dawson, 2000; Weitzman and Chen, 2005) and marijuana smokers (Bonn-Miller and Zvolensky, 2009; Dennis et al., 1999), and comorbid heavy drinking and marijuana use are particularly prevalent among heavy cigarette smokers (Bell, et al., 1997; Everett et al., 1998; Richter, et al., 2004; Wu et al., 1988). The concurrent use of marijuana, tobacco, and heavy alcohol use are linked to a number of health risks (Engs and Aldo-Benson, 1995; Giancola, 2002; Hall et al., 1994; Kalant, 2004; Presley et al., 1996; Tashkin et al., 1990; Wu, et al., 1988), behavioral problems (Abbey, 1991; Abbey et al., 1998; Giancola, 2002; Hingson et al., 2002; Hingson et al., 2005; Jones et al., 2003; Kalant, 2004; Katz et al., 2000; Marcus and Reio, 2002; Montgomery and Haemmerlie, 1993; Newcomb and Bentler, 1999; Wood et al., 2000), and psychiatric comorbidity (Stinson et al., 2006). Recently, increased attention has been called to the importance of examining interactions among different substances and the impact of cessation of one substance on use of the other substance (Bonn-Miller and Zvolensky, 2009; The Substance Abuse and Mental Health Service Administration, 2009).

In contrast to growing research examining the relationship between alcohol and tobacco use in smoking cessation (Abrams et al., 1992; Monti et al., 1995; Prochaska et al., 2008) and alcohol treatment outcomes (Fu et al., 2008; Gulliver et al., 2000; Joseph et al., 2004), much less is known about the relationship of marijuana to cigarette use and heavy drinking in smoking cessation outcomes. Marijuana use has been examined as a predictor of tobacco smoking cessation with mostly equivocal findings (Ford et al., 2002; Gourlay et al., 1994; Humfleet et al., 1999). One prospective study found that cigarette smokers who reported using marijuana at baseline were two to three times more likely than nonusers to still use tobacco at a 13-year follow-up (Ford et al., 2002). Similarly, others have found a reduced likelihood for marijuana users to stop smoking tobacco, as compared to non-users (Gourlay et al., 1994). However, one randomized clinical trial found no differences in post-treatment tobacco smoking cessation outcomes for individuals who used marijuana during smoking cessation treatment as compared to those who did not (Humfleet et al., 1999). In laboratory studies, marijuana administration did not alter typical tobacco smoking topography in one study (Nemeth-Coslett et al., 1986), but led to a significant decrease in cigarette smoking in another study (Kelly et al., 1990). Furthermore, unlike alcohol (Kahler et al., 2010), the role of marijuana use as a proximal predictor of smoking relapse has not been previously examined.

Similarly, very little is known about the impact of marijuana use on drinking during a smoking cessation trial. Although heavy drinking impedes smoking cessation (Hymowitz et al., 1997; Kahler et al., 2009; Osler et al., 1999), many tobacco smokers are able to successfully reduce hazardous drinking in the context of smoking cessation (Kahler et al., 2008; O'Malley et al., 2009). Also, marijuana users in a heavy drinking sample were able to decrease drinking after a brief alcohol motivational intervention (Magill et al., 2009). Findings from these few studies would suggest that heavy drinking marijuana users should have similar positive drinking outcomes as the rest of the sample in a smoking cessation trial.

It is also largely unknown whether marijuana users make any changes to their marijuana use as part of their smoking cessation effort. Among young adults who smoke tobacco and marijuana, quitting cigarette smoking is considered a desirable goal, but few intend to stop using cannabis as part of their smoking cessation efforts (Amos et al., 2004). It is plausible that marijuana use may either remain stable if the person has other available alternatives or even increase following smoking cessation. Restriction of one reinforcer tends to increase the use of other available reinforcers (Vuchinich and Tucker, 1988). It is thus conceivable that abstinent tobacco smokers might continue to use marijuana or perhaps increase their levels of marijuana use to counteract or reduce aversive effects of nicotine withdrawal. Preclinical evidence confirms that acute THC administration indeed helps alleviate symptoms of nicotine withdrawal in animals (Balerio et al., 2004). Despite nicotine replacement treatment, the expectation that quitting smoking may be associated with increased irritability and negative mood (Baker et al., 2004) may be sufficient to motivate other drug use to help cope with these symptoms following cessation of smoking.

Aside from some notable exceptions (McCambridge et al., 2008; McCambridge and Strang, 2004), the problem of trying to change several health-risk behaviors simultaneously has not been studied extensively. Many clinicians also express concern over difficulty in concomitant targeting of multiple substances (Bobo et al., 1995; Monti, et al., 1995) with mixed empirical support for the feasibility of doing so (Kodl et al., 2006). For example, some substance abuse treatment programs suggest delaying smoking cessation efforts for patients in treatment for alcohol dependence and other drugs and some believe that their clients may rely on tobacco smoking for mood management or as a substitute for illicit drug abuse (Richter, 2006).

Despite these concerns, a meta-analysis examining smoking cessation interventions with individuals in substance abuse treatments revealed positive outcomes of concomitant interventions for multiple substances (Prochaska et al., 2004). Exposure to a smoking cessation intervention was associated with a 25% increased likelihood of long-term abstinence from alcohol and illicit drugs. Similarly, a study of pregnant women attempting to quit tobacco, alcohol, and/or caffeine found a clustering of quitting behavior. Although women using multiple substances were less likely to quit than those using only one substance, women who stopped using at least one substance were more likely to stop using a second one (Pirie et al., 2000). Furthermore, smokers in substance abuse treatment do not find the concurrent treatment of drug problems with smoking cessation programs incompatible (Stein and Anderson, 2003). Overall, these studies suggest that smoking cessation efforts with concomitant reductions in drinking and use of other drugs, such as marijuana, are quite feasible and can be successful.

The primary aim of the present investigation was to test the association between marijuana use, alcohol use, and smoking cessation outcomes in a randomized clinical trial that tested the utility of incorporating a brief alcohol intervention into smoking cessation treatment for heavy social drinkers (Kahler et al., 2008). We first examined whether marijuana smokers differed from the rest of the sample in their tobacco smoking and alcohol use outcomes. We then investigated whether marijuana users changed their marijuana use during smoking cessation treatment. Finally, we also examined whether the odds of lapses to smoking were significantly lower on days when marijuana was used compared to non-marijuana days.

2. Methods

2.1. Participants

Participants were 236 heavy drinking smokers recruited from the local community in Southeastern New England who took part in a randomized smoking cessation clinical trial

comparing standard smoking cessation treatment (ST) to standard treatment incorporating a brief alcohol intervention (ST-BI) while on nicotine patch (see Kahler et al., 2008 for full details of the clinical trial). Participants were included if they: (a) were at least 18 years old; (b) had regularly smoked cigarettes for at least one year; (c) were currently smoking at least 10 cigarettes per day; (d) were not using any other tobacco products or nicotine replacement; and (e) drank heavily according to NIAAA guidelines but were not dependent on alcohol (National Institute on Alcohol Abuse and Alcoholism, 1995): for men, >14 drinks per week or ≥ 5 drinks per occasion at least once per month over the past 12 months; for women, >7 drinks per week or ≥ 4 drinks per occasion at least once per month). Participants were excluded if they: (a) met full DSM-IV criteria for alcohol dependence in the past 12 months; (b) met criteria for other current psychoactive substance abuse or dependence (excluding nicotine dependence and alcohol abuse) in the past 12 months; (c) had a current affective disorder; (d) were psychotic or suicidal; (e) had an unstable medical condition that would suggest caution in the use of the nicotine patch (e.g., unstable angina, arrhythmia, recent congestive heart failure); (f) were currently pregnant or lactating or intended to become pregnant.

The sample used in these analyses was 45% female, 90.7% non-Hispanic White, and 33% married. The mean age of the sample was 41.5 ($SD = 12.0$) years, and the mean education was 14.0 ($SD = 2.6$) years. At baseline, participants smoked an average of 21.3 ($SD = 9.4$) cigarettes per day and had been smoking for an average of 22.7 years ($SD = 11.5$). The sample mean on the FTND (Heatherton et al., 1991) was 5.0 ($SD = 2.2$). Participants reported that during the eight weeks prior to treatment, they drank on 54.7% ($SD = 27.3$) of possible days and consumed an average of 16.5 ($SD = 11.9$) drinks per week.

Of the 236 participants, 57 were identified as past month marijuana users with 22.5% meeting DSM-IV criteria for Lifetime Cannabis Abuse and 7.7% meeting criteria for Lifetime Cannabis Dependence. The sample was divided into three groups based on baseline TLFB reports: non-users (no use in past 8 weeks, $n = 179$); infrequent-users (smoked < 8 times in 8 weeks, $n = 28$); and weekly-users (≥ 8 times in 8 weeks, $n = 29$).

2.2. Procedures

Treatment consisted of four weekly individual counseling sessions with the quit date occurring at session 2 (70 min for Session 1, 40 min for Session 2, and 20 min for Sessions 3 and 4). ST-BI incorporated focused discussion of participant's alcohol use, including feedback on the risk of smoking relapse associated with drinking and goal setting regarding changing drinking during smoking cessation. All participants received transdermal nicotine patch (21 mg for the first four weeks, 14 mg for the next two weeks, and 7 mg during the last two weeks). Follow-ups were conducted at 8, 16, and 26 weeks after quit date.

2.3. Measures

Prior to treatment, participants provided demographic and other clinically relevant information. Alcohol and substance use disorder diagnoses and lifetime history of major depressive disorder were assessed using the Structured Clinical Interview for DSM-IV (Spitzer et al., 1990). Severity of nicotine dependence was assessed using the Fagerstrom Test for Nicotine Dependence (FTND; Heatherton et al., 1991), a well-validated 6-item measure ($\alpha = .62$). The Timeline Followback Interview (TLFB) (Sobell and Sobell, 1992) was used at baseline (for the prior 8 weeks) and during follow-up to assess cigarettes/day, number of drinks/week, percent of marijuana use days, and number of other drug use days.

Seven-day point prevalence abstinence was assessed at 2, 8, 16, and 26 weeks after quit date. Self-reported abstinence was verified by alveolar carbon monoxide (CO) at all time

points and by cotinine analysis of saliva samples collected at 16- and 26-week follow-ups. Abstinence was verified by a combination of $\text{CO} \leq 10$ ppm and cotinine ≤ 15 ng/ml (Society for Research on Nicotine and Tobacco Subcommittee on Biochemical Verification, 2002).

A total of 216 (91.5%) participants provided at least some daily TLFB data on alcohol, tobacco, and marijuana use after quit date with 207 (87.7%) providing complete data through 8 weeks after treatment, and 200 (84.7%) providing complete data through 26 weeks. Analyses were conducted using all available data ($N = 216$).

2.4. Data Analysis

As a first step, we conducted preliminary analyses to examine potential differences in variables between the three groups; non-marijuana users, infrequent marijuana users, and weekly marijuana users. One way ANOVAs were used on all continuous variables and chi-square tests were used with dichotomous variables.

2.4.1. Smoking Outcomes—To examine the impact of smoking cessation treatment on tobacco smoking repeated measures analyses were conducted using generalized estimating equations (GEE; Zeger and Liang, 1986) using PROC GENMOD in SAS (SAS Inc., 1997). We used 7-day point prevalence abstinence at the follow-ups as the dependent variable, while controlling for gender, age, and treatment condition. Marijuana use was dummy coded to compare infrequent and weekly users to non-users. We next conducted discrete-time survival analysis using Cox proportional hazards regression models to examine the unique effects of time-varying alcohol use and marijuana use on the risk of an initial smoking lapse after quit date.

2.4.2. Alcohol and Marijuana Use Outcomes—We used GEE analyses to predict average number of drinks per week at 8, 16, and 26 weeks, controlling for baseline drinking. These data were square-root transformed to correct positive skewness. These analyses covaried gender, age, and treatment condition and included dummy-codes contrasting infrequent and weekly users with non-users. They also included a linear effect of time and interaction term between time and the dummy-codes for marijuana use groups. Using the same GEE models, we examined whether treatment condition moderated marijuana use group effect on smoking and drinking outcomes. Dummy-coded treatment condition was included as a predictor in the model along with an additional interaction term between treatment condition and dummy-coded marijuana use entered on the last step in the model. We also used GEE to examine change in marijuana use. Because of the extremely large differences in level of marijuana use between the 3 marijuana use groups, comparisons between groups in marijuana use over time were not of specific interest and were not statistically feasible given large differences in variance. Instead, separate models were run within each of the two user groups to determine whether there was a significant increase or decrease in percent marijuana use days across the baseline, 8-, 16-, and 26-week assessments.

3. Results

Table 1 presents descriptive statistics for the sample. The three marijuana use groups did not differ significantly on demographic characteristics such as gender, ethnicity, marital status, or education, or DSM-IV diagnoses of major depressive disorder and alcohol use disorders, all p 's $> .11$. However, significant group differences were detected for age $F(2, 235) = 6.32$, $p < .01$, with weekly users being significantly younger than non-users. Consistent with this effect, groups also differed significantly on the total number of years smoked tobacco, $F(2, 235) = 4.45$, $p < .05$. Weekly marijuana users reported smoking tobacco cigarettes for less

number of years as compared to non-marijuana users; however, there were no group difference on age of initiation of tobacco smoking (both first cigarette smoked and daily smoking), FTND scores or number of tobacco cigarettes smoked per day. Groups differed on number of days they used other illicit drugs at baseline, $F(2, 235) = 4.74, p < .05$, with non-marijuana users reporting less involvement with other drugs as compared to marijuana user groups.

3.1. Smoking Outcomes

Seven day point prevalence abstinence rates for non-users, infrequent, and weekly marijuana users, respectively, were 34.1%, 39.3%, and 37.9% at 8 weeks ($\chi^2(2, n = 236) = .40, p = .82$); 20.1%, 17.9%, and 3.4% at 16 weeks ($\chi^2(2, n = 236) = 4.74, p = .09$); and 19.7%, 14.3%, and 14.3% at 26 weeks ($\chi^2(2, n = 236) = .82, p = .66$). GEE analyses controlling for gender, age, FTND, and treatment condition indicated that infrequent users and weekly users did not differ from non-users in the odds of smoking abstinence across follow-up: $AOR = 0.96, 95\% CI = 0.48-1.90, p = .91$ and $AOR = 1.13, 95\% CI = 0.63-2.04, p = .69$, respectively.

We next conducted discrete-time survival analysis using Cox proportional hazards regression models to test the hypothesis that the risk of an initial smoking lapse was significantly lower on days when marijuana was used compared to non-marijuana use days. Fifty-one marijuana users were included who provided data on daily alcohol, tobacco, and marijuana use after quit date. Analyses, covaried gender, FTND, treatment condition, and both drinking status and marijuana use status (use on the day when the lapse occurred) as two dichotomous time-varying covariates. Consistent with a past analysis of these data (Kahler et al., 2010), drinking status was associated with significantly increased risk of smoking lapse, hazards ratio (HR) = 3.35, $p < .0001$. However, marijuana use status was not significant, $HR = 0.97, p = .94$, indicating that alcohol but not marijuana use was a predictor of smoking lapse.

3.2. Drinking Outcomes

Figure 1 shows the number of drinks consumed per week for each of the three marijuana use groups from baseline through the 26-week follow-up. In all groups there was a large reduction in weekly alcohol consumption, as previously reported (Kahler et al., 2008), with a particularly notable reduction among the weekly marijuana users by 47% during follow-up. GEE analyses of average drinks per week (square-root transformed) with the chosen covariates indicated that there were no significant differences between non-users and infrequent users ($B = 0.01, 95\% CI = -0.53-0.54, p = .98$) or between non-users and weekly users ($B = 0.26, 95\% CI = -0.14-0.67, p = .20$) at the 8-week follow-up. However, one of the two marijuana groups by time interactions was significant, $B = -0.22, 95\% CI = -0.41$ to $-0.03, p = .02$, suggesting that weekly marijuana users, as compared with non-users, reduced their drinking at a faster rate after the 8-week follow-up (see Table 2).

An additional set of analyses indicated that treatment condition did not moderate marijuana use group effects on smoking ($p > .20$) and drinking outcomes ($p > .30$).

3.3. Marijuana Use Outcomes

Figure 2 shows percent of marijuana use days for each of the three marijuana use groups from baseline through the 26-week follow-up. GEE analyses controlling for gender, age, and treatment condition indicated no significant reduction in marijuana use from baseline through the 26-week follow-up for infrequent users. However, for weekly users, there was a significant linear effect of time, indicating that percent marijuana use days decreased about

4.1 percentage points at each follow-up, $B = -4.10$, 95% $CI = -7.74, -0.46$, $p < .03$. Overall, weekly users reduced marijuana smoking by more than 24% during follow-up.

4. Discussion

The current study aimed to extend the literature on marijuana use in smoking cessation by examining the role of marijuana use in a sample of heavy social drinkers enrolled in smoking cessation clinical trial. The study's aims were to examine: (1) the relation of marijuana use to smoking cessation outcomes; (2) the association between marijuana use and changes in alcohol use; and (3) changes in marijuana use during tobacco cessation process.

Results showed that marijuana use status (non users vs. infrequent users vs. weekly users) during the 8 weeks prior to enrolling in the study did not significantly predict smoking cessation outcome. These findings are consistent with a prior study, which demonstrated that individuals who reported marijuana use at any point during tobacco cessation treatment did not significantly differ from non-users in post-treatment tobacco outcomes (Humfleet et al., 1999). In contrast, Gourlay et al. (1994) found that past month marijuana use at baseline predicted poorer 26-week post quit tobacco cessation outcomes. Although the Gourlay et al. (1994) study involved a larger sample of marijuana users, they did not screen specifically for heavy drinking and did not examine potential differences between the various marijuana use groups, as was done in the present study. Another potential difference to explain the discordant outcomes is that the Gourlay et al. (1994) provided brief 5–10 minute monthly counseling sessions focused on managing weight gain and smoking urges, whereas the current and the Humfleet et al. (1999) studies provided participants with counseling of longer duration focusing on a wider variety of behavioral skills designed to enhance cessation success. It is therefore possible that providing more intensive counseling may perhaps mitigate the influence of marijuana use status on tobacco cessation outcomes. Humfleet et al. (1999) also suggested that differences in cultural norms about marijuana use may account for the divergent findings (the Gourlay et al. study was conducted in Australia).

The current study was the first to examine marijuana use as a proximal predictor of same day tobacco use during treatment. Results showed that, among marijuana users, risk of tobacco smoking lapse was not significantly different on days when marijuana was used compared to non-marijuana use days throughout the tobacco cessation attempt. This finding, in context with the null association between pre-treatment marijuana use and tobacco outcomes, illustrates that marijuana use had little proximal or distal relation to tobacco use outcomes in our sample. It is possible that the consistent relation between current marijuana and tobacco use that has been demonstrated at the population level (Bell et al., 1997; Mohler-Kuo et al., 2003; Richter et al., 2004) may not be explained by a heightened vulnerability to relapse after making a tobacco cessation attempt among marijuana users. An alternate explanation is that marijuana users are more persistent tobacco smokers because they are less interested in quitting rather than more likely to fail following a quit attempt. Indeed, a previous naturalistic study found that marijuana users were less likely to make a tobacco cessation attempt over a subsequent 13 year follow-up period (Ford et al., 2002).

Regarding drinking outcomes, weekly marijuana users, as compared with non-users, reduced their drinking at a significantly faster rate after the 8-week follow-up. Infrequent marijuana users were not significantly different from weekly users and non-users in drinking outcomes. Past research examining individuals undergoing alcohol treatment have generally demonstrated that comorbid drug use predicts poorer drinking outcomes following alcohol treatment (e.g., Kranzler et al., 1996). However, marijuana users may be quite different from other illicit drug users as our findings are consistent with other reports (e.g., Magill et al.,

2009) showing that marijuana use does not hamper the effectiveness of an intervention at least among non-dependent heavy drinkers.

We also examined changes in marijuana use during the study. Infrequent marijuana users evidenced no significant change in marijuana use from baseline through the 26-week follow-up for infrequent users. Infrequent users were using at very low rates at the study's outset, which could have resulted in a floor effect, whereby our ability to detect reductions in marijuana use in this group was limited. Nonetheless, we can conclude that marijuana use did not increase during the trial among infrequent users. Among weekly marijuana users, however, there was a significant linear reduction in proportion of marijuana use days following quit day, with more than a 24% reduction during follow-up. These findings are consistent with reduced marijuana outcomes reported by Magill and colleagues (2009) and add to a growing literature that challenges assumptions that illicit drug use increases following tobacco use cessation (Sussman and Black, 2008) and suggests that drug use typically reduces during smoking cessation treatment (Prochaska et al., 2004).

Mechanisms that might explain such reduction in marijuana use following a smoking cessation treatment have not been studied. All participants in this study were provided transdermal nicotine patch for eight weeks. Nicotine patch has been shown to enhance the cardiovascular effects of smoked marijuana and to increase subjective ratings of stimulation (Penetar et al., 2005). Such findings from human and similar preclinical experimental studies (Valjent et al., 2002) might explain why these two drugs are often used together but would not suggest that nicotine replacement would reduce marijuana smoking. That marijuana use continued to decline beyond the eight weeks of nicotine replacement therapy also suggests that other factors may play a larger role. One possibility is that the behavioral treatment offered in this study influenced marijuana outcomes. However, marijuana use was not explicitly discussed in either of the two behavioral treatment conditions. Because motivation or readiness to change marijuana use was not assessed, we do not know the extent to which reductions in use were a conscious decision. Finally, it is possible that reduction resulted from assessment reactivity effects (Clifford et al., 2007; Maisto et al., 2007; Walters et al., 2009); that is, mere exposure to a structured assessment of marijuana use may have contributed to the subsequent changes in marijuana use.

The current findings should be considered within the context of the study's limitations. First, past year marijuana abuse or dependence was an exclusion criterion for study entry. Thus, it remains unclear whether the current findings will generalize to individuals with more severe patterns of marijuana use. Second, marijuana use was measured via self-report days of marijuana use using the time-line-follow-back calendar method. It would have been preferable to also track marijuana use outcomes via biochemical indicators and alternate self-report measures of marijuana use to examine if findings were consistent across multiple measures. Third, the sample of marijuana users was relatively small, which may have limited statistical power to detect some relationships including smoking outcomes. However, it should be noted that significant effects were detected on several outcomes (i.e., marijuana use change, drinking outcomes), suggesting that statistical power was not a limiting factor for all analyses. As expected from studies with regular marijuana users (e.g., Stinson et al., 2006), frequent (weekly) marijuana users were somewhat younger and therefore had less years of smoking than other groups. However, age was covaried and did not account for any of the findings. Because the sample of frequent marijuana users was particularly small, current findings need to be replicated with a larger sample of heavy marijuana users. Further replication with larger samples of marijuana users would support the inclusion of frequent marijuana users in smoking cessation trials.

The present study was the first trial to examine marijuana use as a proximal predictor of same-day smoking lapse, assess the influence of marijuana use on drinking during smoking cessation, and investigate changes in marijuana use during the smoking cessation process. The findings are encouraging and suggest that marijuana use: (a) is not necessarily detrimental to tobacco use cessation; (b) does not predict increases in alcohol use during smoking cessation (and may actually predict greater drinking reductions); and (c) can decrease during smoking cessation. Accordingly, individuals who concurrently use marijuana, alcohol, and tobacco may profit from combined interventions that target reductions in all three forms of substance use (e.g., McCambridge and Strang, 2004)). The current findings also suggest that such individuals may perhaps derive collateral benefit from tobacco use cessation treatment resulting in corresponding reductions in marijuana and alcohol use.

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Figure 1. Mean number of drinks consumed per week from baseline through the 26 weeks after quit date by marijuana use group. Participants are classified based on baseline reports of marijuana use over the past 8 weeks. Raw (unadjusted) data are shown.

Figure 2. Percent marijuana use days from baseline through the 26 weeks after quit date. Participants are classified based on baseline reports of marijuana use over the past 8 weeks. Raw (unadjusted) data are shown.

Table 1

Demographics and substance use characteristics by marijuana use group at baseline

Variable	Non-users (n = 179)		Infrequent users (n = 28)		Weekly users (n = 29)		p value
	M	SD	M	SD	M	SD	
Age	42.9	12.1	38.6	9.7	35.2	11.1	A
Years smoked	26.8	11.8	22.5	11.2	20.7	11.9	B
Carbone monoxide (CO) level	22.6	.9	18.4	2.3	20.0	2.2	ns
Cigarettes per day	24.4	9.2	21.9	11.8	19.9	7.7	ns
Drinks per week	15.9	11.1	20.2	17.5	16.3	8.7	ns
Other drug use days	.1	.6	.6	2.7	.7	2.2	B
% Marijuana days	--	--	4.7	3.4	41.7	27.4	ns
FTND - Total Score	5.1	2.3	4.8	2.2	4.7	2.1	ns
	%		%		%		
Current Alcohol Abuse	18		32		17		ns
Lifetime Alcohol	14.5		25		27.6		ns
Dependence							

Note. A = Weekly vs. Non-users, $p < .01$; B = Weekly vs. Non-users, $p < .05$

Cigarettes per day, drinks per week, percent marijuana use days, and number of other drug use days (ranging from 0 to 14 days) were derived from the baseline Timeline Followback Interview assessing use in the prior eight weeks. FTND = Fagerstrom Test for Nicotine Dependence (scores ranged from 0 to 10). CO levels reported in parts per million (ppm) ranged from 1 to 65.

Table 2

Baseline Marijuana Use Status Predicting drinking outcome.

Variable	<i>Exp (B)</i>	95% CI	<i>p-value</i>
Time	0.09	0.02, 0.16	0.02
Infrequent	0.01	−0.53, 0.54	0.98
Weekly	0.26	−0.14, 0.67	0.20
Time × Infrequent	−0.12	−0.37, 0.14	0.37
Time × Weekly	−0.22	−0.41, −0.03	0.02

Note. $N = 236$. Average drinks per week was square-root transformed. Covariates in this model include gender, age, pretreatment drinking, and treatment condition. Infrequent and weekly users were dummy-coded to compare against non-users.