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Brief intervention for daily marijuana users identified by screening in primary care: a subgroup analysis of the ASPIRE randomized clinical trial

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Abstract

Background—The use of brief intervention for decreasing frequent marijuana use holds potential, but its efficacy in primary care is not known.

Objective: To assess the impact of two brief interventions on marijuana use among daily/ or almost daily marijuana users.

Design: Subgroup analysis of a 3-arm randomized clinical trial of two brief counseling interventions compared to no brief intervention on daily marijuana use in a primary care setting (ASPIRE).

Participants: ASPIRE study participants who both reported 21–30 days of marijuana use during the past month and identified marijuana as their drug of most concern.

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Interventions: 1) Brief Negotiated Interview (BNI), a 10–15 minute structured interview, and 2) an Adaptation of Motivational Interviewing (MOTIV), a 30–45 minute intervention. Control group participants received only a list of substance use treatment resources.

Main measures: The primary outcome was number of days of marijuana use in the past 30 days at the 6-month follow-up. Secondary outcomes were 1) number of days of marijuana use at 6-week follow-up and 2) drug problems (Short Inventory of Problems, SIP-D) at 6-week and 6-month. Differences between intervention groups were analyzed using negative binomial regression models.

Results—Among the 167 eligible participants, we did not find any significant impact of either of the two interventions on past 30 days of marijuana use at 6-months [adjusted incidence rate ratio (aIRR): 0.95 (95% confidence interval (CI)):0.75–1.15, $p=0.82$ for BNI vs. control; aIRR:1.02, 95% CI:0.85–1.23, $p=0.82$ for MOTIV vs. control]. There was no significant impact on drug-related problems at 6-month follow-up [aIRR:1.12 (95%CI:0.69–1.82) $p=0.66$ and aIRR:1.46 (95%CI:0.89–2.38) $p=0.27$ for BNI vs. control and MOTIV vs. control, respectively]. Results were similar at 6 weeks.

Conclusions—Brief intervention has no apparent impact on marijuana use or drug-related problems among primary care patients with frequent marijuana use identified by screening.

Introduction

Marijuana is the most widely used drug in many developed countries, and it is the illicit drug most commonly used by those who screen positive for drug use in primary care.¹ It is the third most common substance associated with dependence after alcohol and tobacco.² Admissions to treatment for marijuana use disorders are increasing in the U.S.³ as it is associated with physical consequences^{4,5,6,7} and use at early ages is associated with mental health problems.⁸ However, many marijuana users do not experience major health consequences,¹ which reduces the likelihood of treatment seeking or treatment engagement. This, and the absence of empirically supported intervention approaches for addressing marijuana use in primary care represent important challenges for health care providers, in a moment when there are policy changes around marijuana use across the U.S. that may increase its use in the general population.¹

Screening and brief intervention, have proven to be efficacious for unhealthy alcohol use.⁹ Such a brief intervention typically involves feedback and discussion of negative consequences and risks that can enhance motivation to reduce intake as well as provision of nonjudgmental advice and negotiating a plan. There would be considerably more interest in testing if screening and brief intervention might be efficacious for drug use.^{10, 11} Currently, however, little is known about the effect of this strategy on marijuana use in adults identified by screening in primary care, as the studies published so far have been observational in nature,¹² have been performed in other settings (emergency departments or institutions of higher education),^{13, 14} have used lengthy sessions or multiple doses that might not be feasible in a primary care setting,^{15,16} or have shown effects mainly in non-US populations,^{16, 17} in younger users,^{13, 14, 18, 19} or in settings other than primary care.^{3, 18, 19}

The Assessing Screening Plus brief Intervention's Resulting Efficacy to stop drug use (ASPIRE) study was a randomized 3-arm clinical trial which tested the efficacy of two models of brief intervention (a brief negotiated interview and an adaptation of motivational interviewing) compared to no brief intervention for reducing drug use and its consequences in primary care patients identified by universal screening. This study, which included primary care patients who used a broad range of substances, failed to show an impact of either brief intervention on drug use.²⁰ Similar lack of effectiveness of a primary care- based brief intervention for a spectrum of drug use was reported in another recently published randomized controlled trial.²¹

Despite the overall negative findings of these two studies, one could reasonably hypothesize that the brief interventions might have efficacy for frequent marijuana users. People with more frequent use would be more likely to have risks and consequences that could be the basis for eliciting motivation to change, whereas it may be difficult for infrequent users to perceive such risks. We decided to perform a substudy on frequent users, given that some studies about brief intervention for alcohol use have proven it to be efficacious for the higher end of the spectrum of use, either dependence²² or heavy drinking²³ while many have focused on and found efficacy for hazardous use only.²⁴ Currently, there is not enough information in the trials that have tested screening and brief intervention for drug use to parse the differences in efficacy across drug types and severity of use, as most studies have found no^{20, 21, 25} or very small effects.¹⁷ People with more frequent use would be more likely to have risks and consequences that could be the basis for eliciting motivation to change, whereas it may be difficult for infrequent users to perceive such risks. Marijuana use may also be more responsive to brief intervention than cocaine, heroin or prescription drug misuse, which may be more severe, are less socially acceptable, and may require more intensive interventions. Therefore, this subgroup analysis is designed to explore, in the context of a negative parent study, whether brief intervention has an effect on frequency of marijuana use or drug use consequences among a subgroup of patients with daily or almost daily marijuana use. Also, given that readiness to change and consequences of use have been shown to be effect modifiers of brief intervention for unhealthy alcohol use,^{26, 27} we want to assess whether intervention effects may differ based upon drug use severity or readiness to change.

Methods

The present study was a post-hoc subgroup analysis of the effect of two brief intervention counseling interviews compared to no brief intervention on marijuana use and drug use consequences among participants with daily marijuana use in a 3-arm randomized clinical trial (ASPIRE) study.

Participants

Enrollment began on June 1, 2009 and ended on January 31, 2012 within an urban hospital-based primary care clinic. One hundred and sixty seven participants from the ASPIRE trial who reported that marijuana was their drug of most concern ["which substance used in the past month concerned you the most"] and used marijuana on 21–30 days during the past

month, were included in the present study. This range was used because it represented those who reported daily or almost daily marijuana consumption. Eligibility for the ASPIRE trial was:¹⁸ past 3-month unhealthy drug use based on the second item of the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST),²⁰ age 18 years or older; arrived for a visit with a primary care clinician; and substance-specific ASSIST score 4 or greater [that is, drug use weekly or more in the past 3 months or less frequent use but with a consequence]. Exclusion criteria were inability to provide contact information for 2 persons; inability to interview and consent in English; unwilling or unable to participate in follow-up; pregnancy (self-report); brief intervention by preexisting screening and intervention program in the past 3 months; or participation in an on-site addiction treatment program.

The Boston University Medical Campus Institutional Review Board approved the study and all participants provided written informed consent. Confidentiality was further protected by a Certificate of Confidentiality issued by the National Institutes of Health.

Assessments

At study entry we assessed the following by in-person interview: demographics, tobacco use, ASSIST alcohol and drug items,²⁸ drug of most concern (DOMC), Timeline Follow-back (TLFB) for DOMC,²⁹ the 15-item short inventory of problems drugs (SIP-D)³⁰ and stage of readiness to change.³¹

Allocation

Randomization was performed after consent and the baseline assessment. Allocation was performed by the Data Coordinating Center-Boston University School of Public Health after the baseline visit. Participants were randomly assigned (1:1:1) to BNI, MOTIV, or no brief intervention via a central secure website using random permuted blocks of size 3 and 6 stratified by drug dependence and drug of most concern.

Interventions

Interventions occurred immediately after randomization and were performed at the primary care clinic.

The Brief Negotiated Interview (BNI) was a short (10–15 minutes) structured interview conducted by Bachelor's degree level health educators, which included feedback, review of the “pros and cons” of drug use, as well as the development of a plan for change. Those health educators trained for 120 hours initially and received 1–2 booster sessions per year. During the study period, they also had two 90-minute group sessions and one or two 1-hour individual meetings a month with a Master's trained, licensed independent clinical social worker supervisor to discuss job performance and cases, and for direct observation.

The Adaptation of Motivational Interviewing (MOTIV) was a longer (30–45 minutes) and less structured intervention conducted by a Master's degree level health counselor (mainly clinical psychology doctoral students). The intervention included eliciting links between drug use and health consequences, heightening discrepancies between negative drug use outcomes and valued patient goals, enhancing self-efficacy and providing options for

behavior change. Counselors received didactic and experiential training (40 hours) followed by practice towards, and confirmation of proficiency using audio recordings coded for motivational interviewing content. They also had weekly 1-hour meetings to discuss issues surrounding the implementation of the intervention and to review with their supervisor (licensed doctoral level faculty clinical psychologist) audio recordings facilitated by a Motivational Interviewing (MI). A more detailed description of the intervention modalities can be found in the main ASPIRE RCT manuscript.²⁰ Sessions were audio-recorded and then coded; Scores on rating scales suggested that the interventions used motivational interviewing and that the interventions were adequately delivered.

Participants in the control group received no intervention. All participants received information about how to contact resources to address their drug use [Alcoholics Anonymous, Narcotics Anonymous, the hospital behavioral health clinic and emergency department, a state substance use helpline, a city addiction treatment triage program and two different website addresses].

Outcomes

The primary outcome was number of days of marijuana use during the past 30 days assessed by the time line follow back (TLFB) method²⁹ at the 6-month, in-person follow-up. Secondary outcomes were the number of days of marijuana use during the past 30 days at 6-week telephone follow-up and drug use consequences at 6-week and 6-month follow-ups according to the 15-item SIP-D.³⁰

Analysis

We used descriptive statistics to summarize baseline characteristics of the study sample by intervention arm. As in the parent trial, the primary and secondary outcomes were treated as count data and analyzed using negative binomial regression models rather than Poisson due to over dispersion in the data. Models were adjusted for the baseline value of the outcome and Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) score greater than or equal to 27.²⁸ Incidence rate ratios (IRRs) and 95% confidence intervals are reported for each model. The main comparisons of interest were between each intervention vs. control. We corrected for multiple comparisons within each outcome using the Hochberg sequential test procedure.³²

To explore possible effect modification we tested interactions between randomization group and participant's severity (ASSIST score ≥ 27 vs. <27) and readiness to change [readiness score=1 (never think to use less) versus readiness score= 2–4 (which ranges from sometimes thinking about using less to already having tried to cut back)].³¹ Analyses were also stratified separately by each potential effect modifier in order to describe effects within each subgroup. We conducted all analyses on an intention-to-treat basis in that subjects were analyzed according to randomized assignment regardless of whether they received the intervention. Only observed data were used in the primary analysis, missing data were not imputed. All statistical analyses were performed using SAS version 9.2 (SAS Institute, Inc., Cary, NC, USA).

Results

During the recruitment period, 2,624 patients screened positive for any drug use in the past three months in primary care. Of those, 1,504 were approached for the study, 1,287 completed eligibility screening, and 876 were eligible²⁰. Five hundred and twenty-eight participants were included in the ASPIRE trial, in which the follow-up rate was 98%²⁰. Of those 528, 493 (84%) reported any marijuana use in the prior three months, and 167 (32%) reported 21–30 days of marijuana use during the past month, and identified marijuana as their drug of most concern. These 167 participants comprised the study sample for the current analyses; 6-month follow-up was also 98% (164/167).

Table 1 shows baseline characteristics overall and stratified by randomization group [BNI (n=59), MOTIV (n=53), control group (n=55)]. Mean age in the total study population was 39.7 years, and participants were predominantly male (66.5%), black (72.5%) and smokers (72% during the prior 12 months). A majority (58.7%) had a positive Alcohol Use Disorders Identification Test (AUDIT-C)³³ score, 10.2% used other drugs, 12.0% had an ASSIST score 27+ and 25.1% were not ready to change their drug use. The mean number of days of marijuana use at baseline during the past 30 days was 28.1 and the mean SIP-D score at baseline was 7.3. Baseline characteristics were similar across the randomized groups.

Table 2 presents descriptive statistics for the outcomes of interest for the total sample and stratified by randomization group. For the overall sample, the mean number of days of marijuana use decreased from 28.1 at baseline to 23.7 at 6-week follow-up and 23.6 at 6-month follow-up. There were no apparent differences between the BNI or the MOTIV groups compared to controls at 6 weeks or 6 months. Likewise, the mean SIP-D score also decreased from 7.3 at baseline to 5.5 and 6.2, at 6-week and 6-month follow up, respectively, for the total study population; similar results were found for each of the three randomized groups, without apparent differences across groups.

Table 3 shows the negative binomial regression for the number of days of marijuana use in the past 30 days. The main analysis did not find significant effects for either of the two interventions [adjusted IRR (aIRR) 0.95, 95% CI 0.79–1.15, $p=0.82$ for BNI vs control and aIRR 1.02, 95% CI 0.85–1.23, $p=0.82$ for MOTIV vs. control] at the 6-month follow-up. Similarly, there was no apparent impact of either intervention on days of marijuana use at the 6-week follow-up.

Table 4 shows the results of the negative binomial regression for the SIP-D score. There was no apparent impact at 6-months follow-up [aIRR 1.12, 95% CI 0.69–1.82, $p=0.66$ for BNI vs. control and aIRR 1.46, 95% CI 0.89–2.38, $p=0.27$ for MOTIV vs. control]. The results for SIP-D scores at the 6-week follow-up were similar.

We tested for effect modification by the ASSIST score (≥ 27 vs. <27), an indicator of dependence, and also readiness to change [readiness score= 2–4 versus readiness score=1 (never think to use less)]. In analyses adjusted for the baseline values of the outcomes, the p -value for the interaction between randomization group and readiness to change was 0.011 and 0.046 for the SIP-D score at 6-week and at 6-month follow-up, respectively. In subsequent stratified analyses, among the 125 participants with higher readiness to change

(i.e. scores=2–4), there was no significant impact of the intervention group on SIP-D scores at 6 weeks [aIRR (95% CI) of 1.05 (0.62–1.77), Hochberg p-value=0.92 for BNI versus controls and aIRR (95% CI) of 1.03 (0.60–1.77), Hochberg p-value=0.92 for MOTIV versus controls] or at 6 months [aIRR (95% CI) of 0.85 (0.51–1.43), Hochberg p-value=0.81 for BNI versus controls and aIRR (95% CI) of 1.07 (0.63–1.81), Hochberg p-value=0.81 for MOTIV versus controls]. Those analyses were adjusted for the baseline value of the number of days of marijuana use in the past 30 days and ASSIST 27+.

Among the 41 participants with lower readiness to change (i.e. scores=1), MOTIV was associated with higher SIP-D scores, both at 6-weeks [aIRR (95% CI) of 3.14 (0.94–10.5), Hochberg p-value=0.06 for BNI versus controls and aIRR (95% CI) of 6.21 (1.99–19.4), Hochberg p-value 0.003 for MOTIV versus controls], and at 6-months [aIRR (95% CI) of 2.39 (0.66–8.63), Hochberg p-value=0.18 for BNI versus controls and aIRR (95% CI) of 4.16 (1.32–13.1), Hochberg p-value=0.01 for MOTIV versus controls].

No significant interaction was found between readiness to change and intervention on the outcome number of days of marijuana use at 6-weeks ($p=0.58$) or at 6-months ($p=0.65$), and the ASSIST score did not appear to be an effect modifier for the number of days of marijuana use at 6 weeks ($p=0.58$) or 6 months ($p=0.65$) or for the SIP-D score at 6-weeks ($p=0.39$) or 6 months ($p=0.42$).

Discussion

In this study we did not find evidence of an impact of either of two different brief interventions on marijuana use among daily/ almost daily marijuana users who screened positive in an urban, hospital-based primary care clinic. These results are consistent with what was found in the overall analyses of drug users in the main ASPIRE randomized clinical trial.²⁰

The point estimates for the IRR of mean number of days of marijuana use both at 6-month and 6-week follow-up are close to the null (0.95 and 0.94, and 1.02 and 1.03 for BNI versus control and MOTIV versus control, respectively; that is, compared with control, a 5 and 6% lower frequency of days of marijuana use for BNI and a 2 and 3% higher frequency of days of marijuana use for MOTIV). Even though the ASPIRE trial was not powered to identify intervention effects among subgroups (post-hoc power calculations indicate our study would have approximately 80% power to detect mean differences of 5.5 days of use between groups at 6 months assuming a standard deviation of 9 [ratio of means 0.77 for controls vs. BNI/MOTIV]), the observed point estimates are of a clinical magnitude that would likely discourage the implementation of the examined interventions in everyday clinical practice to reduce daily marijuana use. It is conceivable however, that for the BNI, a more intensive intervention might boost the observed, non-statistically significant 5–6% decrease in days use.

We also were unable to detect intervention effects on consequences of drug use measured with the SIP-D at 6-week or at 6-month follow-up. In the stratified analysis by readiness to change, among those participants who were less ready to decrease marijuana use (readiness

to change=1), MOTIV appeared to be associated with a higher SIP-D score. However these results are based on a very small subset of participants, as those with readiness to change in the MOTIV arm accounted for 12 participants. Also, the observed increase is more likely due to heightened awareness and reporting of drug problems after discussing the “pros and cons” during the brief intervention, than to a negative effect of MOTIV in that subset of participants. Nonetheless, it is plausible that brief counseling could lead to more drug problems among patients who never think about using less.

There are a few prior studies that have tested different forms of brief intervention on marijuana use, but the characteristics of the intervention, the setting and the target study population might account for the mixed results. Studies performed in younger patients have shown promising results with an intervention that consisted of 20 minutes by a peer educator in a pediatric emergency service,¹³ or with brief intervention delivered by a computer.³⁴ Other researchers have found a decrease in marijuana use with a greater number of sessions of motivational interviewing in patients that had already been referred to treatment.^{15, 16} In an observational study of the implementation of brief intervention sponsored by the Substance Abuse and Mental Health Services Administration (SAMSHA) in different medical settings,¹² a decrease in drug use was reported, but it might be due to regression to the mean. Another recently published trial of brief intervention performed in four different countries,¹⁷ only showed a decrease in marijuana use in Brazilian and Indian participants, but not in participants from the U.S. In settings other than primary care, a cluster randomization trial study by McCambridge et al. performed in institutions of further education in London found a decrease in marijuana use, but the intention to stop at baseline was a strong predictor of abstinence, and it was not evenly distributed among groups.¹⁴ In another study in a similar setting, the same author observed that brief intervention may not differ from minimal intervention or may not show longer term effects on marijuana use.³⁵ Other authors have reported lower marijuana use with brief interventions in non-treatment seeking adolescents¹⁸ and young women.¹⁹ The non-significant difference observed in days of marijuana use in the BNI arm in our study is of lower magnitude than that observed in a prior study [difference of 4.2 days of marijuana use per month]¹³ while it is consistent with other authors that did not observe differences between groups.¹⁸

One possible explanation for the lack of effect in our study may be that patients might not perceive daily marijuana use as harmful for them. They were also using a substance despite it being illegal. A single brief intervention even with a booster may be insufficient. And although primary care can be an ideal setting for preventive behavioral health counseling, there is little randomized trial evidence favoring brief intervention for drugs in screen-identified populations.

Strengths of the present study include a very homogenous study sample in terms of marijuana use at the high end of the spectrum, few exclusion criteria, a very high follow-up rate and a setting that is close to everyday clinical practice.

Limitations of the present study include design as a secondary subgroup analysis of a large randomized clinical trial. It is possible that since all groups decreased marijuana use frequency and drug use problems, improvements could have been due to assessment effects.

However, the assessment was minimal and in the larger trial, drug use and problems did not decrease. It seems unlikely this would be an explanation for the findings when it did not occur for those with heroin or cocaine use. Also, results of this secondary analysis are consistent with the main finding of the ASPIRE trial, that is, screening and brief intervention did not have an impact on drug use.²⁰

In conclusion, this study shows that two different forms of brief intervention did not significantly decrease marijuana use or drug problems compared to no brief intervention among daily/ almost daily marijuana users detected by screening in primary care. Our results suggest that efforts to address marijuana use and study effective approaches to address problematic use in non-treatment seeking individuals identified by universal screening should shift from screening and one-time brief intervention to other, probably more intensive interventions in primary care. These could include longitudinally and repeatedly monitoring and addressing use.

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Table 1

Baseline characteristics of frequent marijuana users identified by screening in primary care stratified according to randomization group.

	Total (N = 167)	Control (N = 55)	BNI (N = 59)	MOTIV (N = 53)
Age (years) [mean (SD)]	39.7 ± 13.0	40.8 ± 14.0	37.3 ± 12.3	41.1 ± 12.5
Female sex [n (%)]	56 (33.5%)	22 (40.0%)	19 (32.2%)	15 (28.3%)
Race White n (%)	19 (11.4%)	5 (9.1%)	8 (13.6%)	6 (11.3%)
Black race [n (%)]	121 (72.5%)	41 (74.5%)	41 (69.5%)	39 (73.6%)
Smoking in past 12 months [n (%)]	120 (71.9%)	34 (61.8%)	46 (78.0%)	40 (75.5%)
Any other drug use n (%)	17 (10.2%)	3 (5.5%)	6 (10.2%)	8 (15.1%)
AUDIT-C score Positive n (%)	98 (58.7%)	34 (61.8%)	36 (61.0%)	28 (52.8%)
Marijuana-specific ASSIST 27+ n (%)	20 (12.0%)	8 (14.5%)	7 (11.9%)	5 (9.4%)
Not ready to change (1, vs 2–4) [n (%)]	42 (25.1%)	18 (32.7%)	12 (20.3%)	12 (22.6%)
# of days used past 30 days Baseline [mean (SD)]	28.1 ± 2.6	28.1 ± 2.8	28.0 ± 2.7	28.2 ± 2.2
SIP-D Score at Baseline [mean (SD)]	7.3 ± 9.6	6.0 ± 9.4	8.4 ± 9.8	7.3 ± 9.7

BNI= Brief negotiated interview; MOTIV= Adaptation of motivational interviewing; ASSIST= Alcohol, Smoking and Substance Involvement Screening Test; SIP-D= 15-item short inventory of drug problems; AUDIT-C= Alcohol Use Disorders Identification Test.

Table 2

Days of marijuana use and drug use-related problems overall and by assigned brief intervention group versus control

Outcomes	All participants (N = 167)	Control (N = 55)	BNI (N = 59)	MOTIV (N = 53)
# of days used past 30 days at 6-weeks [mean (SD)]	23.7 ± 9.0	24.0 ± 9.0	22.3 ± 9.6	24.7 ± 8.2
# of days used past 30 days 6-months [mean (SD)]	23.6 ± 9.0	23.9 ± 8.7	22.7 ± 9.7	24.4 ± 8.5
SIP-D Score at 6-Week [mean (SD)]	5.5 ± 7.5	4.8 ± 8.4	6.5 ± 7.6	5.1 ± 6.5
SIP-D Score at 6-Month [mean (SD)]	6.2 ± 8.7	4.9 ± 7.7	7.2 ± 9.4	6.6 ± 8.9

BNI= Brief negotiated interview; MOTIV= Adaptation of motivational interviewing; SIP-D= 15-item short inventory of drug problems; SD= standard deviation.

Table 3

Impact of the intervention on the number of days of marijuana use in the past 30 days during follow-up.

Follow-up	Adjusted Mean			BNI vs. Control		MOTIV vs. Control	
	Control	BNI	MOTIV	IRR (95% CI)	Hochberg p-value	IRR (95% CI)	Hochberg p-value
Days marijuana use							
6 weeks	23.5	22.1	24.2	0.94 (0.79, 1.12)	0.77	1.03 (0.86, 1.23)	0.77
6 months	23.6	22.6	24.2	0.95 (0.79, 1.15)	0.82	1.02 (0.85, 1.23)	0.82

BNI= Brief negotiated interview; MOTIV= Adaptation of motivational interviewing.

Adjusted for the baseline value on the number of day of marijuana use in the past 30 days and ASSIST 27+.

Table 4

Impact of intervention on drug use consequence during follow-up [SIP-D Score]

Follow-up	Adjusted Mean			BNI vs. Control		MOTIV vs. Control	
SIP-D score	Control	BNI	MOTIV	IRR (95% CI)	Hochberg p-value	IRR (95% CI)	Hochberg p-value
6 weeks	2.9	4.0	4.2	1.37 (0.84, 2.22)	0.20	1.46 (0.88, 2.41)	0.20
6 months	3.6	4.1	5.3	1.12 (0.69, 1.82)	0.66	1.46 (0.89, 2.38)	0.27

BNI= Brief negotiated interview; MOTIV= Adaptation of motivational interviewing.

Adjusted for the baseline value on the number of days of marijuana use in the past 30 days and ASSIST 27+.