Alcohol and Marijuana Use Outcomes in the Healthy Choices Motivational Interviewing Intervention for HIV-Positive Youth

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Abstract

Healthy Choices is a motivational interviewing intervention targeting multiple risk behaviors among HIV-positive youth. This study investigated the effects of this intervention program specifically on alcohol and marijuana use. Youth living with HIV ($n = 143$, mean age = 20.7, 51.5% male) were recruited from four sites in the United States, and randomly assigned to intervention or control conditions. The four-session intervention focused on two of three possible problem behaviors based on entry screening; this study focused on 143 HIV-positive youth who received the intervention for substance use. At 15-month follow-up past-week alcohol use was significantly lower for intervention youth than control youth (39.7% versus 53.6%, $\chi^2 = 2.81$, $0.05 < p < 0.01$); developmental trajectory analysis demonstrated significant reductions in alcohol use, but more importantly the intervention was effective over time in significantly reducing the adolescent's probability of being classified into the high-risk trajectory group. The intervention was less effective in reducing marijuana use.

Introduction

ALCOHOL AND MARIJUANA USE has been found to be highly prevalent among youth living with HIV (YLH).^{1,2} Substance use carries a number of negative health consequences, and heavy consumption of alcohol may lead to increased risk for toxicity from antiretroviral therapy (ART).³ Among HIV-positive adults, those who drink and are on ART have been shown to be twice as likely to have CD4 counts less than 500 cells per milliliter, and four times less likely to achieve a positive virologic response to medication compared to nondrinkers.⁴ YLH may be more likely to miss medications while under the influence of substances,¹ and several adult studies link alcohol use with lower rates of adherence to ART regimens, with nonadherence increasing with level of drinking severity.⁵ In addition, alcohol use has been shown to co-occur with high-risk sexual behavior,² which may lead to spread of the virus.

Healthy Choices is a Motivational Interviewing (MI) intervention that targets multiple risk behaviors among HIV-positive youth. MI is a patient-centered, goal-oriented process

of communication for eliciting and strengthening intrinsic motivation for health behavior change.⁶ Early studies of MI indicated some success in reducing alcohol use in high school seniors.⁷ In some studies, MI has been shown to reduce marijuana use among adolescents,^{8,9} although other studies have failed to find a clear effect on marijuana use.^{10,11} In a review of 17 MI-based intervention studies targeting adolescents and young adults for alcohol or other psychoactive substance use prevention,¹² 29% of the studies showed a clear advantage of the brief MI in reducing drug risk among adolescents and young adults compared to standard care or other control conditions. The effects of the Healthy Choices MI intervention on adherence and sexual behavior are reported elsewhere; this brief report sought to investigate the effects of the MI-based intervention program Healthy Choices specifically on reduction of alcohol and marijuana use among YLH.

Methods

Study methods have been previously reported.¹³ In brief, youth were participants in Healthy Choices, a randomized,

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multisite clinical trial examining the efficacy of a motivational intervention aimed at reducing high-risk sexual behavior and substance use—particularly alcohol and marijuana use—and promoting adherence in YLH. Inclusion criteria included HIV-positive status, age 16–24 years, and English-speaking. Youth engaged in at least one of three problem behaviors: substance use problem based on an adolescent screener,¹⁴ unprotected sex in the previous 3 months, or less than 90% HIV medication adherence. Exclusion criteria included: currently involved in a behavioral research project (assessment or intervention) targeting any of the three behaviors; engaged in a substance abuse treatment program; and having an active thought disorder. The Adolescent Trials Network (ATN) sites were located in Fort Lauderdale, Florida; Philadelphia, Pennsylvania; Baltimore, Maryland; and Los Angeles, California. Additionally, a non-ATN site was located in Detroit, Michigan. All sites provided HIV primary care with an adolescent medicine specialist and provided the following onsite services: adherence, mental health, and risk reduction counseling, case management, HIV support groups, home visits, peer advocacy and outreach, and transportation. Data were collected using the computer-assisted personal interviewing (CAPI) technology at baseline and 3, 6, 9, 12, and 15-month follow-ups postbaseline. Retention strategies included reminder calls and collaboration with clinic staff to contact hard-to-reach youth. Youth were randomized to Healthy Choices plus standard care or standard care alone. Participants received \$30 compensation for the baseline visit with increases in \$5 increments for subsequent visits.

Healthy choices intervention

The Healthy Choices intervention consisted of four 60-minute individual sessions between the participant and a trained therapist. Sessions were focused on two of the three possible problem behaviors based on entry screening. The current study focused on youth who received the intervention for substance use ($n = 143$). The intervention was derived from Motivational Enhancement Therapy,¹⁵ in which principles of MI are manualized and combined with structured personalized feedback in order to facilitate behavior change. The first two sessions focus on eliciting the participant's view of the two problem behaviors of focus, an examination and discussion of the participant's readiness to change, decisional balance exercises, and the completion of a behavior change plan. The third session focuses on reviewing progress, reinforcing any behavior change demonstrated, and renewing or maintaining commitment for future behavior change. The final session addresses termination, participant's self-efficacy, and plans for long-term maintenance of behavior change. The four sessions were spread out over a 12-week period, with sessions 1 and 2 occurring the first and second week following baseline, session 3 occurring 1 month later, and session 4 occurring 1 month later. The spacing of sessions was designed to allow participants the opportunity to put in practice behavior change, and then return for feedback and additional work with their therapist.

Therapists were doctoral students in psychology or trained clinicians. Therapists participated in a 2-day MI training by members of the Motivational Interviewing Network of Trainers, and received weekly phone supervision and case feedback from one of the supervising trainers. In order to ensure

treatment fidelity to the Healthy Choices protocol, therapists submitted videotaped recordings of each therapy session to the research team both for supervisor review and fidelity coding. Each therapist received weekly telephone supervision from one of three MI trainers working on the project. Supervision meetings lasted for approximately 1 h. Videotapes of sessions were coded using the Motivational Interviewing Treatment Integrity (MITI 2.0) coding system, which produces specific feedback on the therapist's use of MI techniques. Sessions were coded by a member of the MITI Coding Team, a group of seven trained rates whose reliability was assessed using the Intra-Class Correlation (ICC) statistic. To ensure reliability, each rater would periodically code the same sessions and compare results. The results were that coding was highly reliable, with a Cronbach $\alpha = 0.967$; ICC average measures = 0.968, $\alpha = 0.000$. The MITI coding team met weekly over the course of the project to maintain coding reliability. Average global MITI therapist ratings indicated that, throughout the project, all therapists were above the "Beginner Competency" level; there was no significant difference between therapists for competence, and site was controlled for in analyses.

Measures

Demographics. Age, race/ethnicity, biological sex, sexual orientation (heterosexual) were assessed using self-reported data. Sexual minority was coded for those who reported as gay, bisexual versus those reporting a heterosexual orientation.

Use of alcohol and marijuana. Youth reported alcohol and marijuana use (including used/not and the maximum times of use) with the Timeline Follow-Back Procedure.¹⁶ The reported use of alcohol and marijuana in the past 1-week period were included in the analysis.

Statistical analysis

Characteristics of the sample, including the comparability of the intervention group and control group with regard to demographic characteristics and outcome measures at the baseline were assessed using t test and χ^2 test. Variables with missing data were imputed using the Markov Chain Monte Carlo (MCMC) technique. Frequencies for alcohol and marijuana use were first directly compared to assess program effect without considering the non-homogeneity of the study sample. Since the outcome variables for assessing alcohol and marijuana use were not homogeneous and not normally distributed, the program effect was further assessed using the discrete mixture model.¹⁷ Using longitudinal data, this method is capable of classifying subjects into subgroups with distinctive developmental trajectories and more homogeneous distribution if the observed outcome variables are not normally distributed. Since the detected subgroups will be more homogenous, it also enhances statistical power to detect program effect without increasing sample size. Considering the fact that over half of the participants scored zero on the two outcome measures, a Zero-Inflated Poisson (ZIP) distribution was selected for modeling. In conducting the trajectory modeling analysis, the Bayesian information criterion (BIC) was used for model selection (adding one group must result in 5 units reduction in BIC).

Since the participants were randomly assigned to the intervention, and the control and data from our analysis indicated that the two outcome variables assessed for this study were comparable at baseline, the trajectory modeling method provides an approach to assess: (1) whether receiving the intervention also increased the likelihood for participants to fall into a low-risk group and reduced the likelihood to fall into a high-risk group and (2) whether receiving the intervention also reduced the levels of substance use for a specific risk group during the follow-up period.¹⁸ The effect on reductions in the use of alcohol and marijuana were assessed separately. Covariates included in the modeling analysis were age, gender, and study sites (i.e., four dummy variables representing the five sites).

The statistical analysis was conducted using the commercial software SAS (SAS Institute Inc., Cary, NC). The PROC TRAJ program in SAS was used for trajectory modeling.

Results

Among 143 youth qualifying for substance use intervention, 68 were randomly assigned to the intervention group and 75 to the control group. Of the 143 youth, 78.3% were African American; 9.1 Hispanic; 4.2% White; and 8.4% other/mixed race. At baseline, the two groups were comparable with regard to age (M age=20.7 years old for both groups), and the prevalence of use of alcohol (50.0% versus 51.4%, $\chi^2=0.03$, $p>0.05$) and marijuana (35.3% versus 29.7%, $\chi^2=0.50$, $p>0.05$). Also at baseline, the intervention and control groups differed in biological sex (male: 51.5% versus 65.3%, $\chi^2=2.83$, $p<0.05$) and sexual orientation (heterosexual: 51.5% versus 45.3%, $\chi^2=2.83$, $p<0.05$). The follow-up rates were 79.7%, 85.3%, 79.7%, 81.1%, and 79.7% at 3 months, 6 months, 9 months, 12 months, and 15 months postintervention, respectively. No differences in the rates of attrition were statistically significant between the intervention and the control youths at the five follow-up assessments. Missing data were imputed using the MCMC method for those who were lost follow-up.

Comparison of the Prevalence of Use

At baseline among participants in the control group for the past week, 34% used alcohol only, 12% used marijuana only, and 18% used both; the same percentages for the intervention group were 34%, 19%, and 16%, respectively; the difference was not significantly different ($\chi^2=1.33$, $p=0.72$). At 15 months post-intervention among the control participants in the past week, 41% used alcohol only, 11% used marijuana only, and 13% used both; the same percentages for intervention youths were 28%, 16%, and 11%, respectively; the difference was not statistically significant ($\chi^2=2.94$, $p=0.40$).

At the 15-month follow-up, self-reported rates of past-week alcohol use was significantly lower for the intervention youth than for the control youth (39.7% versus 53.6%, $\chi^2=2.81$, $0.05<p<0.01$); however, the differences in marijuana use were not significantly different (25.9% versus 23.2%, $\chi^2=0.11$, $p=0.743$).

Three risk groups

The data fit the model well, BIC = -1135.4 and -1476.0 for alcohol use among participants in the intervention and the

control group respectively; the BIC = -1060.7 and -1138.0 for the two marijuana use groups, model coefficients were all statistically significant at $p<0.01$ level). Developmental trajectory analysis indicated that all participants could be divided into three distinct groups for either alcohol use or marijuana use (times of use in the past week) across 6 waves of data collected throughout the 15-month trial (Fig. 1; intervention and control group analyzed separately).

Low-risk group (LRG). Characterized by a trajectory with a very low level of use for alcohol (61.1% in the intervention group and 53.6% in the control group) and marijuana (66.4% in the intervention group and 64.0 in the control groups), respectively.

Moderate-risk group (MRG). For alcohol use (27.1% for the intervention youth and 32.9% for the control youth), this group showed a trajectory of using on an average of 2 or more times in the past week; for marijuana use (28.5% for intervention youth and 29.6% for control youth), the trajectory is characterized with, on average, 2–4 times of use in the past week.

High-risk group (HRG). For alcohol use, 11.8% of the participants in the intervention group and 13.5% in the control group were classified into this group. The same proportions for marijuana in the HRG were 5.2% for the intervention youth and 6.4% for the control youth, respectively. Participants in the HRG group showed a trajectory of use characterized by very high frequencies of past-week use (typically 8 times or more for alcohol use and 10 times or more for marijuana).

An inspection of this finding suggest that although the participants in the two study groups were comparable at the baseline when they were admitted into the trial, the proportion of participants in the LRG group was greater for the intervention youth than for the control youth (61.1% versus 53.6%); and a reverse pattern was revealed for the proportion of youth in the HRG group.

Intervention effect

In Table 1 the sample is pooled together with intervention as the predictor variable; results from logistic regression analysis indicate that receiving the behavioral intervention significantly reduced the likelihood for a participant to be classified into HRG (adjusted odds ratio [OR]=0.23, 95% confidence interval [CI] 0.06–0.91, $p<0.05$). Receiving the behavioral intervention was also associated with lower levels of time trajectories of alcohol use for participants in the MRG ($\beta=-0.134$, $p<0.05$) and HRG ($\beta=-0.547$, $p<0.01$) after controlling for covariates age, gender, and study sites. Last, receiving the intervention reduced the levels of past-week marijuana use for participants in the LRG (adjusted $\beta=-1.977$, $p<0.01$) and MRG (adjusted $\beta=-0.141$, $p<0.05$). It is worth noting that the mean times of use in the LRG group were only close to zero even though it appears equal to zero in Fig. 1.

Although the sample is relatively small, the identification of subjects by subgroups and separation of subjects with outcome=zero from the rest increased statistical power by substantially reducing the standard deviation of the outcome measures in individual groups.¹⁷ For example, the coefficient

FIG. 1. Trajectories (predicted) of alcohol and marijuana use (maximum times) in the past week. Intervention and control.

of variation (a measure of homogeneity of a variable) coefficient of variation (CV) = mean/standard deviation (SD) = $9.1/4.5 = 2.0$ for the maximum times of alcohol use ($n = 68$ the total YLH in the intervention group) at baseline; among these youth CV = $14.9/12.5 = 1.2$ for those in the high-risk group.

Discussion

Alcohol and marijuana are the most common substances of abuse among adolescents. Overall, Healthy Choices appears to reduce alcohol use among YLH. By the 15-month follow-up, only 37.9% of the intervention group reported using alcohol in the past week, whereas 53.6% of the control group reported use. More importantly, this MI-based intervention was effective over time in reducing the adolescent's probability of being a high-risk drinker, with the intervention significantly reducing the likelihood for an adolescent to be classified into the high-risk trajectory group. In previous studies, MI was found to be more effective for reducing heavy

drinking among patients with mild to moderate alcohol dependence than a feedback/education session or multiple sessions of nondirective reflective listening.¹⁹ Similarly, in this study the intervention appeared to have the largest effect on the high-risk drinking group.

The intervention had what would appear to be a clinically significant—as well as statistically significant—effect for alcohol use. However, there was a reduction of marijuana use only for low and moderate users. Again, this corresponds to previous studies that have shown MI to be more effective in reducing substance use among the at-risk or mildly dependent, rather than for more severely dependent persons.²⁰

Reducing HIV-positive adolescents' alcohol use may also have beneficial effect on their medication adherence. Lower alcohol use has been associated with medication adherence among HIV-infected adolescents.²¹ Moreover, it may also have beneficial effects on other health behaviors, as substance use plays a significant role in high-risk sexual behavior.²² However, it also appears that the benefits of MI for substance-using

TABLE 1. INTERVENTION EFFECT ON GROUP MEMBERSHIP AND ITS TRAJECTORIES OVER TIME

Identified group (proportion)	Effect on group assignment OR (95% CI)		Effect on time trajectory (β coefficient)	
	Unadjusted	Adjusted ^a	Unadjusted	Adjusted ^a
Alcohol use ($n=143$)				
Max times in the past week				
Low-risk group (LRG, 59.3%)	0.85 (0.43–0.68) ^b	0.92 (0.45–1.89)	–0.002	0.109
Moderate-risk group (MRG, 30.4%)	2.01 (0.96–4.23)	1.95 (0.90–4.22)	–0.269 ^c	–0.134 ^b
High-risk group (HRG, 10.3%)	0.27 (0.07–1.00) ^b	0.23 (0.06–0.91) ^b	–0.329 ^c	–0.547 ^c
Marijuana use ($n=143$)				
Max times in the past week				
Low-risk group (LRG, 34.5%)	0.81 (0.41–1.61)	0.76 (0.38–1.54)	–0.446 ^b	–0.977 ^c
Moderate-risk group (MRG, 57.6%)	1.40 (0.72–2.72)	1.50 (0.75–3.01)	–0.158 ^c	–0.141 ^b
High-risk group (HRG, 7.9%)	0.61 (0.17–2.17)	0.61 (0.16–2.32)	–0.027 ^b	–0.065

^aAdjustment was made for confounders of age, gender, and study sites.

^b $p < 0.05$, ^c $p < 0.01$.

OR, odds ratio from logistic regression analysis; CI, confidence interval.

youth may take some time to take effect, as the significant differences between the trajectory groups became more apparent over time. Although the majority of studies of MI show that effects emerge relatively quickly,²³ the notion of a delayed effect is consistent with some previous findings. For example, in one study motivational therapy (in conjunction with contingency management) had the highest rates of success at later follow-ups.²⁴ Similarly, another study of MI for college students showed a “sleepier effect,” in which the strongest effects were identified at 15-months after brief intervention.²⁵

The effects of Healthy Choices appear to vary based on frequency of alcohol and marijuana use/group membership, and thus may be hard to determine without conducting trajectory analyses. This may account in some cases for previous discrepant findings about the efficacy of this type of intervention for youth.¹² However, MI interventions for YLH show some promise in reducing alcohol and marijuana use risk—one of many risk behaviors engaged in by this population—and studies to replicate these secondary analyses should be conducted.

There are a number of limitations to this study. We compared a four-session intervention plus standard care to standard care alone, and thus we did not match for time. However, these limitations are somewhat offset by the fact that the number of sites is a strength of the study, as was the centralized supervision. Another limitation was that the study relied on self-reported substance use, and could be subject to social desirability influences. In addition, the sample size was fairly small, and was primarily African American (78.3%). Analyses were conducted to determine if race/ethnicity or gender orientation had any effect in changing the results, and their inclusion had no effect. However, this would be better investigated in a larger study that includes a higher proportion of non-African American youth. Finally, results need to be confirmed, and with larger sample sizes of HIV-positive substance using youth so that other factors (e.g., different developmental age ranges, ethnicity) can be investigated.

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