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Motivational Enhancement Therapy for Adolescent Marijuana Users: A Preliminary Randomized Controlled Trial

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Abstract

This study's aims were (a) to investigate the feasibility of a school-based motivational enhancement therapy (MET) intervention in voluntarily attracting adolescents who smoke marijuana regularly but who are not seeking formal treatment and (b) to evaluate the efficacy of the intervention in reducing marijuana use. Ninety-seven adolescents who had used marijuana at least 9 times in the past month were randomly assigned to either an immediate 2-session MET intervention or to a 3-month delay condition. Two thirds of the sample characterized themselves as in the precontemplation or contemplation stages of change regarding marijuana use. Participants' marijuana use and associated negative consequences were assessed at baseline and at a 3-month follow-up. Analyses revealed that both groups significantly reduced marijuana use at the 3-month follow-up ($p < .001$); however, no between-group differences were observed. Despite the absence of a clear effect of MET, this study demonstrated that adolescents could be attracted to participate in a voluntary marijuana intervention that holds promise for reducing problematic levels of marijuana use.

Keywords

motivational enhancement therapy; adolescents; cannabis; marijuana; school based

Data from the 2004 national survey of high school students indicated that marijuana use is prevalent among adolescents (Johnston, O'Malley, Bachman, & Schulenberg, 2005). More than one third of high school seniors (34%) used marijuana at least once in 2004, and daily use of marijuana was reported by 6% of high school seniors (the respective rates for high school sophomores were 28% and 3%). Recent research has suggested that adolescents who smoke marijuana regularly are at greater risk of experiencing adverse health and psychosocial consequences including less frequent condom use, higher frequencies of sexually transmitted diseases and pregnancies, early school drop out, delinquency, legal problems, and lowered educational and occupational expectations (Brook, Adams, Balkoa, & Johnson, 2002; Brook, Balkoa, & Whiteman, 1999; Lynskey, Coffey, Degenhardt, Carlin, & Patton, 2003; Tapert, Aarons, Sedlar, & Brown, 2001). Earlier and greater involvement with marijuana increases the

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risk for developing drug abuse or dependence as an adult (Substance Abuse and Mental Health Services Administration Office of Applied Studies, 2002).

Although recent advances have been forged in the development and evaluation of marijuana treatments for adolescents (Dennis et al., 2002; Diamond et al., 2002), fewer than 10% of adolescents reporting substance-use disorder symptoms in the past year have ever received treatment (Titus & Godley, 1999). Adolescents who do present for substance abuse treatment almost never self-refer but rather are referred to treatment (e.g., by parents, the juvenile justice system, or schools). In addition, when adolescents do enter treatment for marijuana, few (20%) believe their use is problematic (Diamond, Leckrone, Dennis, & Godley, 2006). Taken together, these findings suggest the need for interventions to increase motivation for change and encourage treatment entry.

Motivational enhancement therapy (MET) is one approach to motivating change in substance use (Miller & Rollnick, 1991, 2002). MET provides personalized feedback on substance use in combination with a motivational interviewing counseling style (Miller & Rollnick, 2002). MET has been found to be an effective approach to reducing marijuana use in adults (Marijuana Treatment Project Research Group, 2004; Stephens, Roffman, & Curtin, 2000) and has demonstrated promise with adolescent substance abusers (Aubrey, 1997; Colby et al., 1998; Monti et al., 1999).

The Teen Marijuana Check-Up (TMCU) was developed as an alternative approach for adolescents to address concerns about marijuana use outside of formal treatment (Berghuis, Swift, Roffman, Stephens, & Copeland, 2006). The TMCU is a program that includes a specific advertisement and recruitment strategy as well as an MET intervention designed for delivery in the schools. Aimed at a voluntary, non-treatment-seeking population recruited from high schools, the program was advertised as an opportunity to “take stock” of marijuana use and was intended to facilitate a candid, in-depth evaluation of an individual's use. The brevity of the MET and its low barriers to access encourage participation with minimal effort. In MET, ambivalence about marijuana use is viewed as normal, adolescents are not labeled as having a problem with marijuana, and adolescents are treated as experts and decision makers regarding their marijuana use. Thus, it is meant to appeal to those in earlier stages of change. Fifty-four adolescents who had used marijuana at least once in the past 30 days were recruited to participate in an initial uncontrolled pilot study. Participants were assessed at baseline and at a 3-month follow-up, and all received one MET session focused on marijuana. Findings from this pilot study demonstrated that teen marijuana users in high school would participate in an MET intervention. Overall, participants reduced their use of marijuana at the 3-month follow-up, but the lack of a control group prohibited attributing the change to the intervention. Individuals who used marijuana on 9 or more days per month were more likely to make changes, suggesting that more regular users may be most likely to benefit.

The above findings led to the design of a subsequent test of the MET intervention with an independent sample of heavy marijuana users. In the current study, we further developed and evaluated the MET using a randomized two-group design that compared the MET intervention with a delayed treatment control condition.

Method

Participants

Participants were 97 adolescents recruited from four Seattle high schools. The screening interview was completed by 184 students. Most (74%) were self-referred following an educational classroom presentation. School staff (17%), friends and relatives (8%), and advertisements (1%) also served as referral sources. Inclusion criteria were (a) 14–19 years of

age, (b) in Grades 9–12, and (c) used marijuana on at least 9 of the last 30 days. This frequency criterion was intended to enroll a sample of regular, that is, “more than weekend only,” users. Participants were excluded if they (a) were not fluent in English, (b) showed evidence of a thought disorder that precluded participation, or (c) refused to accept randomization to condition. Over half of participants who were screened were eligible ($n = 102$, 55%), and 97 (95%) of those eligible chose to participate. Eighty of the 82 ineligible participants had not used marijuana on 9 days in the past month. All measures and procedures were approved by the University of Washington human subjects review board.

Design

Recruitment and confidentiality procedures—Participants were recruited through classroom presentations, advertisements, and referrals. Project publicity emphasized that the program was a free, nonjudgmental, and confidential service for adolescents who would like information on their marijuana use. Participants were compensated with gift certificates for each of the two feedback sessions they attended (\$15) and at the 3-month follow-up assessment (\$20).

The classroom recruitment presentations were designed to convey accurate and balanced marijuana information, be interactive, describe the research study, and provide an opportunity for teens to privately indicate interest in participating in the study by writing their names on an otherwise anonymous evaluation of the presentation completed by all members of the class. Those interested were called out of class for a screening interview. Classroom passes signed by a school staff liaison were used so that the student's participation in the marijuana study would not be disclosed to teachers or other nonproject personnel.

Screening and informed assent—We had interested teens complete a brief screening interview to assess eligibility before scheduling the baseline assessment. The screening interview included a stage of change algorithm with statements corresponding to precontemplation, contemplation, preparation, action, or maintenance stages (e.g., precontemplation: “I’m basically satisfied with my use of marijuana and do not plan to change”; Prochaska et al., 1994).

Informed assent procedures were completed for eligible teens. The University of Washington institutional review board waived the requirement of parental consent, noting that “minors already are able to consent to drug treatment in Washington State without parental consent, because seeking parental consent could constitute an additional risk to minors, and could inhibit them from seeking treatment, and because risks, which are likely to be low, are well monitored and well managed.”

Assessment procedures—Measures were chosen that would provide indices of the hypothesized effects of the intervention and generate data to be used in the personal feedback reports. Only measures related to primary marijuana use outcomes are described in this abbreviated report. Baseline and 3-month follow-up assessments were administered by an audio-computer-assisted self-interviewing program. Computer-assisted self-interviewing technology has been tested with adolescents, including surveys of sexual behaviors and drug use (Turner et al., 1998).

Research staff—Research staff were called *health educators* (HE), and the same HE conducted the screening, baseline, and intervention for a given participant. A different HE was assigned to conduct the follow-up.

Measures

Marijuana, alcohol, and other drug use were assessed with 31 questions taken from the Global Appraisal of Individual Needs—Initial version (GAIN-I; Dennis, 1998) that assess both quantity and frequency of substance use with regard to marijuana, alcohol, and other drugs. Treatment utilization related to alcohol and other drugs also was assessed through items from the GAIN-I. Studies with both adults and adolescents have found this measure to have good reliability and validity (Dennis, 1998).

Diagnostic and Statistical Manual of Mental Disorders—(4th ed.; American Psychiatric Association) marijuana abuse and dependence symptoms were assessed with 17 items from the GAIN-I. We used 7 items to assess abuse (range = 0–7) and 10 items to assess dependence (range = 0–10). We modified the items to determine whether statements applied to specific time periods (i.e., during the last 60 days vs. more than 60 days ago) so that both recent and lifetime indices could be calculated. Sums of symptoms for the last 60 days were used as a secondary outcome measure.

Self-efficacy for avoiding marijuana use, costs and benefits for reducing marijuana use, pros of marijuana use, life goals, and marijuana effect expectancies were also assessed and included in the personalized feedback reports, but outcome analyses for these measures are not presented in the interest of space.

Following baseline assessment, participants were stratified on stage of change (precontemplator/contemplator vs. preparation/action/maintenance) and grade level (9th/10th vs. 11th/12th) and then randomly assigned to receive the intervention immediately (MET) or after a 3-month delay (delayed feedback control [DFC]). Random assignment occurred independently at each of the four high schools. Sample sizes at each school varied (range = 15–46 participants) and were too small to be included as a factor in outcome analyses.

MET Intervention

The intervention consisted of two sessions with an HE lasting 30–60 min. In general, sessions were completed 1 week apart and were conducted at the high schools during the school day. Ninety-four percent of MET participants completed Session 1, and 77% completed Session 2. Consistent with an MET model, personalized feedback was delivered with a motivational interviewing style throughout. Feedback consisted of the following domains: normative comparisons of marijuana use, patterns of marijuana use, positive and negative aspects of marijuana use, marijuana expectancies, problems related to use, quantity and frequency of alcohol and other drug use, social support, life goals and their relationship with marijuana use, costs and benefits of reducing their use, and self-efficacy for resisting use. If a participant indicated a desire to reduce his or her use of marijuana, a skills booklet featuring exercises for goal setting, trigger identification, and quitting strategies was offered and reviewed.

Therapist Training and Fidelity

HEs were two master's-level and one bachelor's-level clinicians. Training consisted of a detailed review of the manual, 20 hr of training in MET, and a minimum of two pilot cases. Weekly group supervision was provided. All sessions were audiotaped. Ratings of adherence and checklists were completed by HEs after each session and indicated that the intervention sessions were delivered in a manner consistent with the protocol. All audible audiotapes ($n = 71$) were rated for adherence by two independent coders using adapted procedures developed for the National Institute on Drug Abuse Clinical Trials Network (Ball, Martino, Corvino, Morgenstern, & Carroll, 2002). Results indicated that HEs were using techniques consistent with MET and avoiding behaviors inconsistent with MET. Process assessments administered

to participants at the end of each feedback session indicated that HEs were positively perceived by participants and that participants were generally satisfied with the intervention experience.

Results

Participants

See Table 1 for participant demographic information. Overall, 43 participants (44%) met Diagnostic and Statistical Manual of Mental Disorders (4th ed.) criteria for cannabis dependence (three or more dependence symptoms) in the past 60 days, and an additional 23 (24%) reported consequences consistent with the diagnosis of cannabis abuse. The rate of cannabis dependence at anytime in the past was 73%, with an additional 13% meeting criteria for abuse.

Outcomes

Groups (MET vs. DFC) did not differ on any baseline demographic variables, with the exception of ethnicity (White vs. non-White), $\chi^2(1, N=97) = 4.63, p < .05$. Preliminary analyses showed no effect of ethnicity on marijuana use or interaction with treatment condition, and thus it was not included in outcome analyses. All outcome analyses were performed on an intention-to-treat basis. Follow-up data were obtained from 95% of participants overall (91% of MET participants and 98% of DFC participants).

We used separate 2 (condition: MET vs. DFC) $\times$ 2 (grade level: 9th/10th vs. 11th/12th) $\times$ 3 (stage of change: precontemplation vs. contemplation vs. preparation/action/maintenance) $\times$ 2 (time: baseline vs. follow-up) general linear model analyses to compare groups on frequency of marijuana use, dependence, and abuse symptoms. A significant effect of time showed an overall decrease in days of marijuana use in the past 60 days, $F(1, 81) = 11.10, p < .01$, that was qualified by a significant interaction of time, grade level, and stage of change, $F(2, 81) = 3.91, p = .02$. Only participants in the 9th and 10th grades who indicated that they were in the preparation/action stage of change showed a statistically significant reduction in marijuana use at follow-up ($p < .05$), although small cell sizes may suggest caution in the interpretation of this unexpected finding. The hypothesized Condition $\times$ Time interaction and the interaction of Condition $\times$ Stage of Change $\times$ Time were not significant. Table 2 shows means and standard deviations for frequency of marijuana use, grouped by treatment condition. Although there was slightly greater change in the MET condition, the between-groups effect size at follow-up was small ($d = 0.08$). Similar general linear model analyses revealed no significant effects for number of marijuana dependence and abuse symptoms ($p > .05$).

We used a chi-square test to evaluate differences between conditions for participants who could be classified as attaining a meaningful change. *Meaningful change* was defined as having reduced baseline marijuana use by at least 50% by the 3-month follow-up or having reported symptoms of abuse and/or dependence at baseline and having reported no such symptoms at the 3-month follow-up. No difference was found between conditions on participants classified as changers versus nonchangers, $\chi^2(1, N = 93) = 1.60, p > .05$ (MET = 45%, DFC = 33% classified as changers).

Discussion

This study demonstrated success in recruiting non-treatment-seeking adolescent marijuana smokers who were predominantly at early stages of readiness for change. A majority of those enrolled endorsed diagnostic criteria for cannabis abuse or dependence, although only one third had ever had counseling that focused on alcohol or other drug use. Thus, the MET program

overcame barriers to reaching adolescents who were regularly using marijuana, many of whom were experiencing problems related to their use.

Compared with adolescents presenting for marijuana outpatient treatment in the Cannabis Youth Treatment (CYT) study (Dennis et al., 2004), the current sample reported greater marijuana use at baseline (MET = 64%, CYT = 37%) and higher rates of prior substance abuse treatment (MET = 34%, CYT = 26%). Juvenile justice system involvement with over half the CYT sample may have contributed to an underestimate of use prior to treatment entry. Nevertheless, this suggests the MET program attracted users similar to or more severe than a sample of teens engaged in treatment.

Differential between-group outcomes were not found, although significant reductions in marijuana use were reported overall. It is unknown whether the decrease in marijuana use across conditions was an effect of the assessment or a function of natural change. There was some evidence of decreased use being associated with initial stage of change, although the relationship was stronger in younger rather than in older participants. The assessment battery was carefully constructed to record both the positive and negative aspects of participants' marijuana use and to not appear biased toward demanding change. For example, the pros and cons of marijuana use were explicitly asked. It is therefore possible that our assessment battery prompted self-evaluation similar to an MET session. Studies designed to explicitly assess the effects of the assessment process, including assessment at intervention, are needed.

Overall, participants reduced marijuana use by 16% (6 days) over a 60-day period. Reductions of this magnitude are modest and may be unlikely to impact negative consequences. Meaningful change as defined above was achieved by 45% of MET and 33% of DFC participants. Given that this program reached and engaged a population that was otherwise not being seen, continued interest in this program is warranted.

Because MET clearly holds promise for reaching teens who are problematically using marijuana, further development of the check-up intervention studied in this trial is warranted. Two MET studies on adolescents have been published, both by the same research group, and have reported small to medium effect sizes for target substance-using behavior (smoking, drinking; Colby et al., 1998). Findings of significance have been reported for behaviors related to substance use, such as drinking and driving or associated negative consequences (Monti et al., 1999). Although marijuana abuse and dependence symptoms were assessed in this study, other negative consequences measures were not employed. As an example, the impact of marijuana use on school-related responsibilities was not evaluated. Future research would benefit from a broader assessment of related behaviors (e.g., driving while high) and consequences of marijuana use.

It is conceivable that had additional supports for marijuana cessation been available and easily accessible to the participants immediately following their exposure to the MET, more behavioral change might have occurred. In this study, a teen who voluntarily entered the program to get support would likely not have found it feasible to get additional support without disclosing to parents or teachers about seeking such help. Inaccessibility to adolescent-focused treatments may have prevented some teens in this study from further change, although this was not specifically assessed. Future studies of MET could make additional follow-up treatment readily available to those participants who wanted assistance in making changes.

There are several limitations to these conclusions. Gift certificates for participation in the intervention sessions may account for some of the appeal, and additional studies are needed to assess participation under different incentive conditions. The lack of assessment measures related to harm reduction of marijuana-related behaviors and the reliance on self-reports may have provided an incomplete picture of outcomes. Finally, a larger sample size is needed to

adequately explore differential effects in subgroups defined by age and motivation for change, given the likelihood of smaller effect sizes in adolescent drug users without extrinsic motivations for change. However, given that the MET intervention attracted voluntary participation from heavy marijuana users and was associated with decreases in marijuana use, it warrants further evaluation.

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Table 1
Demographic and Drug Use Measures at Baseline

Variable	Immediate ^a	Delayed ^b	Total ^c
Age (in years)	15.74 (1.24)	15.76 (1.39)	15.75 (1.32)
Sex (%)			
Male	57	40	48
Female	43	60	52
Race (%)			
White	64	42	53
African American	19	14	17
Latino	2	8	5
Asian/Pacific Islander	6	16	11
Multiracial	9	20	14
Grade (%)			
9th	38	38	38
10th	17	18	17
11th	26	22	24
12th	19	22	21
Stage of change (%)			
Precontemplation	34	28	31
Contemplation	34	36	35
Preparation	15	18	17
Action	15	14	14
Maintenance	2	4	3
Lifetime treatment ^d (%)	34	34	34
Age of first marijuana use (years)	12.74 (1.54)	12.00 (1.65)	12.36(1.63)
Days of marijuana use ^e	39.02 (17.09)	37.24 (17.03)	38.10 (17.00)
Days of alcohol use ^e	7.53 (9.44)	9.26 (11.33)	8.42 (10.44)
Days of other drug use ^e	1.87 (5.01)	2.58 (6.07)	2.25 (5.56)

Note. All values are means followed by standard deviations in parentheses, unless otherwise indicated.

^a $n = 47$.

^b $n = 50$.

^c $n = 97$.

^d Lifetime treatment for alcohol or drugs.

^e In the last 60 days.

Table 2

Mean (SD) Number of Days of Marijuana Use in the Last 60 Days by Condition and Time

Condition	Baseline	3-month follow-up
MET	39.70 (17.02)	31.05 (23.28)
DFC	36.82 (16.94)	32.76 (20.61)
Total	38.18 (16.95)	31.95 (21.81)

Note. $N = 93$. MET = motivational enhancement therapy; DFC = delayed feedback control.