Effects of the National Youth Anti-Drug Media Campaign on Youths

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Between 1998 and 2004, the US Congress appropriated nearly $1 billion for the National Youth Anti-Drug Media Campaign. The campaign had 3 goals: educating and enabling America's youths to reject illegal drugs; preventing youths from initiating use of drugs, especially marijuana and inhalants; and convincing occasional drug users to stop.[1] The campaign, which evolved from advertising efforts by the Partnership for a Drug-Free America,[2] did not expect to affect heavy drug users.

The campaign was designed to be a comprehensive social marketing effort that aimed antidrug messages at youths aged 9 to 18 years, their parents, and other influential adults. Messages were disseminated through a wide range of media channels: television (local, cable, and network), radio, Web sites, magazines, movie theaters, and several others. Additionally, the campaign established partnerships with civic, professional, and community groups and outreach programs with the media, entertainment, and sports industries. Across its multiple media outlets, the campaign reported buying advertising from September 1999 through June 2004; it was expected that, on average, a youth would see 2.5 targeted ads per week. Sixty-four percent of the gross rating points (GRPs) purchased for the ads were on television and radio. (Within the advertising industry, GRPs are the customary units for measuring exposure to ads. If 1% of the target population sees an ad 1 time, that ad earns 1 GRP).

The youth-focused ads, including ads targeted at African American youths and Hispanic youths (in Spanish), fell into 3 broad categories: (1) resistance skills and self-efficacy, to increase youths' skill and confidence in their ability to reject drug use; (2) normative education and positive alternatives, addressing the benefits of not using drugs; and (3) negative consequences of drug use, including effects on academic and athletic performance. The emphasis on each theme varied across the 5 years of the campaign studied here. To unify its advertising, beginning in 2001, the campaign incorporated

a youth brand phrase: "———: My Anti-Drug" (with "Soccer," for example, filling in the blank). Most campaign ads up to late 2002 did not concentrate on a specific drug, although some ads named marijuana. In late 2002, the campaign introduced the Marijuana Initiative, which altered the ads' mix of messages to a focus on specific potential negative consequences of marijuana use. In the final 6 months evaluated here, about half of the ads were focused on an "early intervention" initiative, that encouraged adolescents to intervene with their drug-using friends.

The campaign involved many institutions. It was supervised by the White House Office of National Drug Control Policy, with overall campaign management by advertising agency Ogilvy and Mather and public relations and outreach efforts by Fleishman Hillard. Most ads were developed on a pro bono basis by individual advertising agencies working with the Partnership for a Drug-Free America. The evaluation, mandated by Congress, was supervised by the National Institute on Drug Abuse and undertaken by Westat and the Annenberg School for Communication at the University of Pennsylvania.

Objectives. We examined the cognitive and behavioral effects of the National Youth Anti-Drug Media Campaign on youths aged 12.5 to 18 years and report core evaluation results.

Methods. From September 1999 to June 2004, 3 nationally representative cohorts of US youths aged 9 to 18 years were surveyed at home 4 times. Sample size ranged from 8117 in the first to 5126 in the fourth round (65% first-round response rate, with 86%–93% of still eligible youths interviewed subsequently). Main outcomes were self-reported lifetime, past-year, and past-30-day marijuana use and related cognitions.

Results. Most analyses showed no effects from the campaign. At one round, however, more ad exposure predicted less intention to avoid marijuana use ($\gamma = -0.07$; 95% confidence interval [CI]$= -0.13, -0.01$) and weaker antidrug social norms ($\gamma = -0.05$; 95% CI$= -0.08, -0.02$) at the subsequent round. Exposure at round 3 predicted marijuana initiation at round 4 ($\gamma = 0.11$; 95% CI$= 0.00, 0.22$).

Conclusions. Through June 2004, the campaign is unlikely to have had favorable effects on youths and may have had delayed unfavorable effects. The evaluation challenges the usefulness of the campaign. (*Am J Public Health.* 2008;98:2229–2236. doi:10.2105/AJPH.2007.125849)

We examine the campaign's effects on youths between September 1999 and June 2004, from its full national launch to 9 months after a major refocusing, partly in response to earlier evaluation results.[3] Effects on parents are reported separately.[4]

METHODS

Sample and Procedure

Our primary evaluation tool was the National Survey of Parents and Youth (NSPY), an in-home survey of youths and their parents living in households in the United States. The first round of data collection consisted of 3 waves, approximately 6 months apart, between November 1999 and June 2001. Eligible youths (aged 9–18 years) were reinterviewed for the second round (July 2001–June 2002), third round (July 2002–June 2003), and fourth round (July 2003–June 2004). Across rounds 1 through 4, a total of 8117, 6516, 5854, and 5126 youths were interviewed, respectively. The sample was selected to provide an efficient and nearly unbiased cross-section of US youths and their parents. Respondents were selected through a stratified

4-stage probability sample design: 90 primary sampling units—typically county size—were selected at the first stage, geographical segments were selected within the sampled primary sampling units at the second stage, households were selected within the sampled segments at the third stage, and then, at the final stage, 1 or 2 youths were selected within each sampled household, as well as 1 parent in that household.

The sample for the initial round of the study comprised 3 cohorts that were interviewed in different waves of data collection. The first cohort (from wave 1) was interviewed again at waves 4, 6, and 8. The second and third cohorts (from waves 2 and 3, respectively) were combined and reinterviewed at waves 5, 7, and 9. Waves 1 through 3 were considered round 1, with pairs of subsequent waves combined for rounds 2, 3, and 4. The overall response rate among youths for the first round was 65%, with 86% to 93% of still eligible youths interviewed in subsequent rounds. (A table giving an overview of the study sample cohorts and a data collection timeline is available as a supplement to the online version of this article at http://www.ajph.org.)

NSPY questionnaires were administered on laptop computers brought into the respondents' homes. The interviewer recorded answers for the opening sections, but for most of the interview, to protect privacy, respondents heard prerecorded questions and answer categories through headphones and responded via touchscreen selection on the computer. Interviews could be conducted in English or Spanish.

Measures

The analyses reported here were based on 3 types of measures: recalled exposure to antidrug messages aired by the campaign and other sources; cognitions and behavior related to marijuana, as outcomes; and individual and household characteristics, including a wide range of variables known to be related to drug cognitions and use and to exposure to antidrug messages.

Exposure measures. A measure of general exposure to antidrug advertising was derived from responses to questions about advertising recall for each medium or media grouping: television and radio, print, movie theaters or videos, and outdoor advertising. An example question, based on wording from the Monitoring the Future Survey,[5] read, "The next questions ask about antidrug commercials or ads that are intended to discourage drug use. In recent months, about how often have you seen such antidrug ads on TV, or heard them on the radio?"

In addition, the NSPY measured prompted recall of specific campaign television and radio ads. In general, up to 4 television and 2 radio ads scheduled to air in the 2 months preceding the interview were randomly selected and presented in full via the computer. Respondents were asked, "Have you ever seen or heard this ad?" and "In recent months, how many times have you seen or heard this ad?" Respondents answered through precoded response categories. If more than 4 television or 2 radio youth-targeted ads had been on the air in the previous 2 months, recall data were imputed for all those not presented. There is substantial evidence for the validity of this specific measure when recall of a campaign ad is compared with that of ads never broadcast and to total GRPs purchased for that ad.[6]

Outcome measures. For 3 reasons, all drug-related measures reported here relate to marijuana use. First, marijuana is by far the illicit drug most heavily used by youths.[5] Second, for other drugs, the low levels of use meant that the NSPY sample sizes were not large enough to detect meaningful changes in use with adequate power. Third, to the extent that the campaign did target a specific drug, it was almost always marijuana.

The behavior measures reported here include lifetime, past-year, and past-30-day use of marijuana. To measure lifetime use, the respondent was told, "The next questions are about marijuana and hashish. Marijuana is sometimes called pot, grass, or weed. Marijuana is usually smoked, either in cigarettes, called joints, or in a pipe. Hashish is a form of marijuana that is also called hash. From now on, when marijuana is mentioned, it means marijuana or hashish. Have you ever, even once, used marijuana?" This was followed up by the question, "How long has it been since you *last* used marijuana?" Possible responses were (1) "During the last 30 days," (2) "More than 30 days ago but within the last 12 months," and (3) "More than 12 months ago."

The cognitive measures were developed on the basis of 2 health behavior theories, the theory of reasoned action[7] and social cognitive theory.[8] Four measures or indices represented the following constructs: (1) marijuana intentions, (2) marijuana beliefs and attitudes, (3) social norms, and (4) self-efficacy to resist use.

The intention measure was based on one question that asked, "How likely is it that you will use marijuana, even once or twice, over the next 12 months? When we say marijuana, we mean marijuana or hashish." The answer categories provided the following alternatives: "I definitely will not," "I probably will not," "I probably will," and "I definitely will." For analytic purposes, the responses were dichotomized into "I definitely will not" vs other responses. Consistent with the theory of reasoned action, this intention measure proved to be a powerful predictor of future behavior: among those aged 12.5 to 18 years who said they had never used marijuana, 9% of those who answered "definitely will not" at a given round reported use when they were reinterviewed 12 to 18 months later at the next round. By contrast, 39% of prior nonusers who gave any other answer said at the next interview that they had initiated use.

The antimarijuana attitudes and beliefs index included responses to 8 specific expected-outcome questions (e.g., "How likely is it that the following would happen to *you* if you used marijuana, *even once or twice*, over the next 12 months? I would: Get in trouble with the law," with responses on a 5-point scale from "very unlikely" to "very likely"). Initially, respondents who had never used marijuana were randomly selected to be asked about the consequences of marijuana use on a trial basis ("even once or twice") or regularly ("nearly every month"), whereas all of those who had previously used marijuana were asked regular-use questions.

For trial use, respondents were asked how they rated ("very unlikely" to "very likely") the following possible consequences of marijuana use: "Upset my (parents/caregivers)," "Get in trouble with the law," "Lose control of myself," "Start using stronger drugs," "Be more relaxed," "Have a good time with my friends," "Feel better," and "Be like the coolest kids." For regular use, possible consequences were as follows: "Damage my brain," "Mess up my life," "Do worse in school," "Be acting against my moral beliefs," "Lose my ambition," "Lose my

friends' respect," "Have a good time with my friends," and "Be more creative and imaginative."

The index also included responses to 2 attitude scales in a semantic differential format: "Your using marijuana *nearly every month* for the next 12 months would be ——," with 2 sets of responses, both on a scale of 7: "extremely bad" to "extremely good" and "extremely unenjoyable" to "extremely enjoyable." For these items, respondents were again assigned trial-use or regular-use questions, depending on whether they had previously used marijuana.

To create the overall index, we used data from waves 1 and 2, regressing all of the belief and attitude items on the intention question and assigning weights to each item for the overall scale that reflected those coefficients. The summed index was then scaled so that the mean (and standard deviation) for the entire population of nonusers aged 12 to 18 years at wave 1 was set to 100. Among all youths (users and nonusers) aged 12.5 to 18 years, those who scored above the median on the index had a relative odds of 21.7 of responding "definitely will not" to the intention measure compared with those who scored below the median.

The anti-marijuana social norms index was created with a statistical approach parallel to that of the attitudes and beliefs index. There were 5 parallel questions that assessed social normative pressure regarding marijuana use. They asked about perceptions of friends' marijuana use, other peers' marijuana use, parents' disapproval of "your" marijuana use, friends' disapproval of "your" marijuana use, and disapproval of "your" marijuana use by most people important to you, in the context either of use "even once or twice" or of use "nearly every month" over the next year. Through use of a regression model, the questions were then weighted according to their ability to predict the intention to use marijuana once or twice in the next year. The summed index was scaled so that the mean (and standard deviation) for the entire population of nonusers aged 12 to 18 years at wave 1 was set to 100. Among all youths (users and nonusers) aged 12.5 to 18 years, those who scored above the median on the index had a relative odds of 17.4 of responding "definitely will not" to the intentions measure compared with those who scored below the median.

Finally, for the antimarijuana self-efficacy index, all respondents were asked the same 5 questions about their confidence that they could turn down use of marijuana under various circumstances: "How sure are you that you can say no to marijuana, *if you really wanted to*, if: You are at a party where most people are using it? A very close friend suggests you use it? You are home alone and feeling sad or bored? You are on school property and someone offers it? You are hanging out at a friend's house whose parents aren't home?" Through use of a regression model, these 5 questions were then weighted according to their ability to predict the intention to use marijuana once or twice in the next year. Once again, the summed index was scaled so that the mean (and standard deviation) for the entire population of nonusers aged 12 to 18 years at wave 1 was set to 100. Among all youths (users and nonusers) aged 12.5 to 18 years, those who scored above the median on the index had a relative odds of 4.0 of responding "definitely will not" to the intentions measure compared with those who scored below the median, making this the least predictive of the 3 indices.

Potential confounder measures. The analyses employed propensity scoring for confounder control by weighting adjustments,[9–14] incorporating a wide range of standard demographic variables and variables known to be related to youths' drug use or thought likely to be related to exposure to antidrug messages. Propensity scores were developed for the general and specific exposure measures. More than 150 variables were considered possible confounders. (For a detailed description of the propensity scoring process and the confounders included in the final models, see Orwin et al.[4]) They include age; gender; race/ ethnicity; wave of survey response; urban– rural residency; neighborhood characteristics from the 2000 US Census[15]; school-related variables, including self-reported academic performance, family functioning, extracurricular activities, perceived parental supervision, association with antisocial peers, and media consumption. A wide range of parents' questionnaire items were also considered potential confounders, including household income; responding parent's demographics; media use; use of alcohol, tobacco, and illicit drugs; and involvement with their children. In addition to the variables listed here, an overall estimate of the level of risk of marijuana use was developed and used as a potential confounder in the propensity scoring models.

Regarding individual risk of marijuana use, an empirically derived risk score was created as the regression-defined weighted sum of a set of youth and parent risk factors that were predictive of marijuana use. Those that had independent predictive weight included youth's age, sensation seeking,[16] urbanicity, cigarette and alcohol use more than 12 months prior to the date of questionnaire completion, and religious involvement, along with shared parenting and marijuana, tobacco, and alcohol use by the parent. Risk was an important predictor of marijuana initiation. Among the 12.5- to 18-year-olds, 1 in 4 of those with a higher risk score (> 0.08 on a 0–1 scale), but 1 in 12 of those with a lower risk score (≤ 0.08), reported initiation at the next interview.

Statistical Analyses

Given the campaign's national coverage, our evaluation was forced to rely on naturally occurring variation in campaign exposure among individuals to estimate the campaign's effects, after adjustment for variation in potential confounders, including the amount and type of media consumption. Whereas comparisons between geographic areas were considered an alternative approach for providing exposure variation, the advertising agency's projected buying plans did not forecast such variation. Three types of analysis were conducted, with claims of effect strongest if the results of all 3 were consistent.

First, the evaluation examined changes over time in each outcome, on the assumption that a successful campaign would produce trends in desired antidrug directions. However, upward or downward trends can be the result of many influences, without the campaign necessarily being the cause.

Second, the evaluation examined the associations of individuals' exposures to antidrug advertising with concurrent drug-related outcomes, with statistical control for potential confounders through the use of propensity scoring. These associations were computed from data pooled across all survey rounds. The relationship between exposure and each outcome was estimated by Goodman and

Kruskal's gamma statistic (see, for example, Agresti[17]). The gamma statistic, which estimates both the direction and strength of an association between 2 ordinal variables, can vary between −1 and 1, with 0 indicating no association. These cross-sectional gamma statistics provide evidence as to whether variations in individual exposure and outcomes are associated, once likely confounders are controlled, but they do not establish whether exposure influenced the outcome or whether the supposed outcome influenced recall of exposure.

The third mode of analysis addressed the issue of causal direction by examining whether exposure at one round of data collection was associated with outcomes at the next round, once confounders, including prior round outcomes, were controlled. The analyses (referred to as lagged analyses) were also pooled across rounds, with exposure measures taken from the first 3 rounds and the outcome measures taken from the second through fourth rounds.

Each of the analyses was performed for all youths, as well as for important subgroups defined by gender, age, race/ethnicity (White, African American, Hispanic), and risk of marijuana use (lower and higher). Analyses were restricted to youths who were nonusers of marijuana at the current round (for cross-sectional analyses) or at the previous round (for lagged analyses). The focus on nonusers and their transition to first use is consistent with one of the campaign's goals: preventing any drug use. The campaign also aimed to encourage those who were using occasionally to reduce their use. However, that objective is not examined here because the sample sizes of occasional users did not provide sufficient power to detect effects on that subpopulation.

Weights were used in all analyses to compensate for differential probabilities of selection, nonresponse, and undercoverage. We adjusted the cross-sectional weights for nonresponse by using demographic, household, and neighborhood characteristics. In addition to these variables, prior-round measures of general exposure and marijuana-related outcomes were used to adjust the longitudinal weights. Sampling errors were computed with a jackknife replication methodology that accounted for the NSPY's complex sample design.[4]

To maintain consistency for all analyses, and because by the fourth round the sample contained few youths younger than 12.5 years, only those youths aged between 12.5 and 18 years at the time of outcome measurement are included. However, all conclusions presented here were supported by prior analyses with the broader age range of youths.[18]

RESULTS

Youths reported substantial exposure to antidrug advertising. Overall, 94% of youths reported general exposure to 1 or more antidrug messages per month, with a median frequency of about 2 to 3 ads per week, consistent with the campaign's GRP purchases. Fifty-four percent of youths recalled at least weekly exposure to specific campaign television ads that had aired in recent months. At the same time, there was considerable variability among youths in their exposure levels. Across the campaign, 15%, 31%, 38%, and 16% recalled seeing less than 1, 1 to less than 4, 4 to less than 12, and 12 or more campaign television ads per month, respectively.

There was no change in the prevalence of marijuana use among those aged 12.5 to 18 years between 2000 and 2004. A small but significant increase in antimarijuana beliefs and attitudes was not accompanied by significant parallel gains in intentions not to use, social norms, or self efficacy (Table 1). There were some significant year-to-year changes (including an antimarijuana shift in intentions from 2002 to 2004) and a few significant changes for subgroups of the population.[4]

In general, lower- and higher-risk youths, and younger and older youths, differed markedly in their absolute levels of marijuana use and in antimarijuana cognitions, whereas there were minimal differences in these outcomes by gender or race/ethnicity. In most cases, the changes from 2000 to 2004 for subgroups were broadly similar to those displayed in Table 1 for all youths.[4]

There is little evidence for a contemporaneous association between exposure to antidrug advertising and any of the outcomes, after adjustment for confounders. Nonusers who reported more exposure (general or specific) to antidrug messages were no more likely to express antidrug cognitions than were youths who were less exposed (Table 2). The same analyses were undertaken for subgroups

defined by age, gender, race/ethnicity, and risk score. Only 3 of the 80 gammas in these analyses were significant; they may easily be chance findings.

The final set of analyses examined whether exposure during an earlier round of measurement was associated with outcomes among 12.5- to 18-year-olds at the next round of measurement, after we controlled for confounders measured at the earlier round. These analyses were conducted separately for each pair of consecutive rounds, as well as with data pooled across all 3 round pairs (i.e., pairs of consecutive rounds). Outcomes included cognitive measures and initiation of marijuana use since the prior round. The results from the pooled data show no evidence of antimarijuana lagged effects. Rather, they indicate the possible presence of pro-marijuana effects: 2 of 10 associations were statistically significant, both in a pro-marijuana direction, and results for 6 of the remaining 8 lagged analyses were in an unfavorable direction (Table 3). Examination of the 80 subgroup analyses reveals 20 significant effects, with 19 of those in a pro-marijuana direction. Thus, there is an overriding pattern of unfavorable lagged exposure effects.

To investigate whether the effects of the campaign differed over its duration, the lagged analyses were carried out separately for each of the paired rounds. The results in Table 4 show no significant antimarijuana lagged associations, and at least 1 significant pro-marijuana lagged association, for each of the paired rounds. In the analysis of round 3 to round 4, the effect of exposure to general antidrug messages also includes a barely significant association in the direction of increased initiation of marijuana use.

DISCUSSION

Overall, the campaign was successful in achieving a high level of exposure to its messages; however, there is no evidence to support the claim that this exposure affected youths' marijuana use as desired. Analyses of the NSPY data for the full sample yielded no significant associations of exposure with cognitive outcomes when both were measured simultaneously. There is some evidence that exposure to the campaign messages was related to pro-marijuana cognitions on a delayed basis

TABLE 1—Changes Among Youths Aged 12.5 to 18 Years in Marijuana Use Cognitions and Behavior: National Survey of Parents and Youth, United States, 2000–2004

	Year					
Outcome	2000	2001	2002	2003	2004	Change[a] From 2000 to 2004 (95% CI)
All youths, %						
Lifetime use of marijuana	23.6	24.8	25.5	23.7	23.5	−0.1 (−2.9, 2.8)
Past-year use of marijuana	17.1	16.9	17.7	17.4	16.7	−0.4 (−2.6, 1.9)
Used marijuana in past 30 days	7.8	8.6	9.6	8.5	8.2	0.4 (−1.4, 2.2)
Nonusers of marijuana						
Definitely not intending to use marijuana, %	86.7	85.3	85.4	86.3	87.5	0.8 (−1.0, 2.6)
Antimarijuana self-efficacy index score, mean[b]	102.6	100.8	106.3	107.9	105.0	2.4 (−3.3, 8.2)
Antimarijuana social norms index score, mean[b]	103.6	98.7	103.3	99.8	104.8	1.2 (−5.1, 7.3)
Antimarijuana attitudes and beliefs index score, mean[b]	105.1	101.3	108.5	108.8	111.4	6.3* (0.4, 12.2)

Note. CI = confidence interval. Data pertain to the National Youth Anti-Drug Media Campaign.
[a]Percentage-point change.
[b]The outcome indices were scaled so that the mean (and standard deviation) for the entire population of nonusers aged 12 to 18 years at wave 1 was set to 100.
*$P<.05$.

throughout the campaign. In light of these findings, we examined the apparent implication that the campaign was not effective and discuss possible mechanisms by which it could have had unfavorable effects. The findings of unfavorable effects are particularly worrisome because they were unexpected and were found not only for cognitions but also for actual initiation of marijuana use.

Comparison of These Results With Other Relevant Evidence

There are a number of other sources that provide trend data concerning marijuana use.[19–21] Some sources have shown a downturn in use among some youths from 1999 to 2004, whereas the NSPY did not show a parallel change over the same period. However, results from the NSPY are similar to those from the National Survey on Drug Use and Health (to the extent that they are comparable), and the other surveys are quite different in that they are conducted in schools and not households.[4] Furthermore, even if they were entirely consistent and universally present, trend results alone would not provide solid grounds for a claim of success or failure of the campaign, because they may have been influenced by secular forces other than the campaign's ads and public relations efforts. The presence of such other forces is suggested by the fact that there are even larger declines in both tobacco and alcohol use than in marijuana use in 2 other surveys,[19,20] suggesting that all substance use was on a downward trend regardless of the campaign. No other studies have provided information that is comparable to the lagged associations between exposure and subsequent outcomes shown in Tables 3 and 4, and such additional evidence is crucial for making causal inferences about the campaign's effects.

Possible Reasons for Lack of Evidence of Success

Two alternative explanations for the sparse evidence of the campaign's success are that (1) the evaluation was insensitive to its success or (2) the campaign was indeed not successful. Each alternative is worth some discussion.

Is it possible that the program was successful but the evaluation failed to find supporting

TABLE 2—Cross-Sectional Association of Exposure to Antidrug Advertising and Marijuana-Related Outcomes Among Nonusers of Marijuana Aged 12.5 to 18 Years: National Survey of Parents and Youth, United States, 1999–2004

	General Exposures per Month				Specific Exposures per Month				
	<4	4–11	≥12	γ (95% CI)	<1	1–3	4–11	≥12	γ (95% CI)
Definitely not intending to use marijuana, %	86.9	85.1	86.2	−0.01 (−0.06, 0.05)	87.5	86.3	85.0	87.4	−0.02 (−0.07, 0.03)
Antimarijuana self-efficacy index score, mean[b]	101.7	102.7	107.5	0.03 (−0.00, 0.07)	106.4	102.9	103.8	110.3	0.02 (−0.01, 0.05)
Antimarijuana social norms index score, mean[b]	100.6	100.4	102.3	0.00 (−0.03, 0.02)	111.6	100.4	101.1	103.3	−0.02 (−0.04, 0.01)
Antimarijuana attitudes and beliefs index score, mean[b]	104.5	105.3	108.6	0.02 (−0.01, 0.04)	109.9	105.1	103.3	112.1	0.00 (−0.02, 0.02)

Note. CI = confidence interval. Data pertain to the National Youth Anti-Drug Media Campaign. Estimates were adjusted for confounders (see "Methods" section for details). General and specific exposures refer to exposure to campaign ads as a whole and exposure to specific ads, respectively.

TABLE 3—Lagged Association of Exposure to Antidrug Advertising at Earlier Round and Marijuana-Related Outcomes at Next Round Among Nonusers of Marijuana Aged 12.5 to 18 Years at Earlier Round: National Survey of Parents and Youth, 1999–2004

	General Exposures per Month				Specific Exposures per Month				
	<4	4–11	≥12	γ (95% CI)	<1	1–3	4–11	≥12	γ (95% CI)
Definitely not intending to use marijuana, %	82.3	78.2	78.4	-0.07* (-0.13, -0.01)	84.0	78.8	77.6	78.5	-0.02 (-0.07, 0.03)
Antimarijuana self-efficacy index score, mean[b]	98.0	95.5	98.2	-0.01 (-0.05, 0.03)	107.3	95.2	96.4	91.4	0.00 (-0.04, 0.03)
Antimarijuana social norms index score, mean[b]	95.3	87.0	87.7	-0.03 (-0.06, 0.00)	107.1	91.3	83.3	76.9	-0.05* (-0.08, -0.02)
Antimarijuana attitudes and beliefs index score, mean[b]	100.3	91.8	95.2	-0.01 (-0.04, 0.02)	105.6	94.8	91.3	90.4	-0.02 (-0.04, 0.00)
Initiating marijuana use, %	10.7	11.2	12.5	0.07 (-0.01, 0.15)	10.8	12.6	11.5	13.2	-0.02 (-0.13, 0.08)

Note. CI = confidence interval. Data pertain to the National Youth Anti-Drug Media Campaign. Data were pooled across round pairs (i.e., pairs of consecutive rounds). General and specific exposures refer to exposure to campaign ads as a whole and exposure to specific ads, respectively. Estimates were adjusted for confounders (see "Methods" section for details).
*Significantly different from 0 at P < .05.

evidence? There are some possible circumstances under which the evaluation might not have detected true effects. The evaluation focused on comparing youths who reported different levels of ad exposure. There was substantial variation in self-reported exposure. However, if youths who were personally exposed shared their new learning with those who were not personally exposed, the campaign's effects would be diffused across social networks so that analyses focused on

individual differences in exposure would underestimate the effects. However, except in the implausible case that the effects diffused across the entire population of the United States, there should still be some associations between individual exposure and outcomes.

Another concern might be that the first round of NSPY data collection was undertaken simultaneously with the launch of the full campaign, and after substantial prior efforts in its developmental stages. Thus, the evaluation

might have missed startup effects. However, the other national surveys of drug use found no significant decreases between 1998 and 2000 in the outcomes they measured related to marijuana use, making it unlikely that the effects were already present by 2000. Also, if exposure to the campaign after 1999 was not positively associated with the outcomes, as both the trend and association data show, then the conclusion that the campaign after 1999 was unsuccessful remains correct, regardless of what happened before.

Alternatively, if the campaign actually has been unsuccessful, how can that be explained? A number of previous mass-media, anti–substance abuse campaigns have affected the substance use of young people, including their use of tobacco[22–28] and marijuana[29–31] and possibly of alcohol consumption before driving.[32,33] Although not all such campaigns are effective, there are now a reasonable number of examples of successful campaigns.[34,35] Why, then, does this campaign appear to have been unsuccessful thus far?

One explanation is that the campaign did not add appreciably to the large quantity of anti-drug messages youths were already receiving. In 2000, recent background exposure to anti-drug messages was reported by more than 50% of youths—through, for example, in-school drug education (66%), conversations with friends about negative consequences of drug use (52%), 2 or more conversations with parents about drugs (54%), and weekly exposure to nonadvertising mass-media content about drugs and youths (54%). Relative to this

TABLE 4—Lagged Association of Exposure to Antidrug Advertising at Earlier Round and Marijuana-Related Outcomes at Next Round Among 12.5- to 18-Year-Olds Who Were Nonusers of Marijuana at Earlier Round, by Round Pair: National Survey of Parents and Youth, 1999–2004

	Round 1 Effects on Round 2, γ (95% CI)	Round 2 Effects on Round 3, γ (95% CI)	Round 3 Effects on Round 4, γ (95% CI)
	General exposure		
Definitely not intending to use marijuana	-0.16* (-0.27, -0.06)	0.01 (-0.07, 0.09)	0.01 (-0.08, 0.09)
Antimarijuana self-efficacy index	-0.05 (-0.10, 0.01)	0.02 (-0.04, 0.09)	0.01 (-0.05, 0.06)
Antimarijuana social norms index	-0.06* (-0.12, -0.01)	0.02 (-0.03, 0.06)	-0.02 (-0.07, 0.02)
Antimarijuana attitudes and beliefs index	-0.03 (-0.08, 0.02)	0.02 (-0.03, 0.07)	-0.01 (-0.05, 0.04)
Initiating marijuana use	0.08 (-0.05, 0.20)	0.01 (-0.11, 0.13)	0.11* (0.00, 0.22)
	Specific exposure		
Definitely not intending to use marijuana	-0.05 (-0.13, 0.03)	0.01 (-0.06, 0.09)	-0.01 (-0.09, 0.08)
Antimarijuana self-efficacy index	-0.03 (-0.08, 0.03)	0.01 (-0.06, 0.07)	0.02 (-0.05, 0.08)
Antimarijuana social norms index	-0.04 (-0.08, 0.00)	-0.05* (-0.10, -0.00)	-0.07* (-0.12, -0.02)
Antimarijuana attitudes and beliefs index	-0.01 (-0.05, 0.02)	0.00 (-0.04, 0.03)	-0.03 (-0.08, 0.01)
Initiating marijuana use	0.02 (-0.09, 0.14)	0.00 (-0.12, 0.12)	0.07 (-0.02, 0.16)

Note. CI = confidence interval. Data pertain to the National Youth Anti-Drug Media Campaign. General and specific exposures refer to exposure to campaign ads as a whole and exposure to specific ads, respectively. Estimates were adjusted for confounders (see "Methods" section for details).
*Significantly different from 0 at P < .05.

level of background exposure, across the NSPY's 4 rounds, youths recalled a median frequency of exposure to campaign ads of once to twice per week, mostly through television. Because an ad is typically 15 to 30 seconds in length, 2 such ads would produce up to about one minute per week of antidrug message exposure. Given all the antidrug messages to which youths were already subject prior to the campaign, the fact that the implicit messages of the campaign were not novel and that the incremental exposure was small, a lack of campaign effects is perhaps unsurprising.

What is harder to explain is the possibility suggested by the lagged results of an *unfavorable* influence of exposure to the campaign. This is sometimes called a boomerang effect.[36] Of several possible explanations, we offer here 2 speculative ideas, which admittedly are somewhat at odds with the reasons just given for the lack of favorable results.

One idea, which comes from psychological reactance theory,[37,38] argues, in part, that youths react against threats to their freedom of choice by experiencing and succumbing to pressure to reestablish that freedom, including some pressure to engage in the proscribed behavior. By this explanation, youths who were exposed to these antidrug messages reacted against them by expressing pro-drug sentiments; the greater the exposure, the stronger this reaction. In analyses reported elsewhere, however, we did not find support for this explanation.[39,40]

The second idea is that antidrug advertising conveys an implicit meta-message that drug use is commonplace. As a result, youths who saw the campaign ads took from them the message that their peers were using marijuana. In turn, those who came to believe that their peers were using marijuana were more likely to initiate use themselves. There was evidence consistent with this speculation: more ad exposure was associated with the belief that other youths were marijuana users, and this belief was predictive of subsequent initiation of marijuana use (data not shown).[4,40]

Conclusions

The evidence does not support a claim that the campaign produced antimarijuana effects. Palmgreen et al. have reported such effects, but only in 2 medium-sized cities for one 6-month period of the campaign.[41] In contrast, the current evaluation provides some evidence that the campaign had pro-marijuana effects. The boomerang pattern, however, was irregular: it was not evident among cross-sectional associations, was significant for only some outcomes and time periods in the lagged analyses, and showed an increase in initiation of marijuana use only between rounds 3 and 4. At the start of this project, the evaluation team stipulated that it would confidently claim an antimarijuana effect for the campaign only if it were to affect trends, cross-sectional associations, and lagged associations. Against these criteria, the claim that the campaign produced pro-marijuana effects has tentative but not definitive support.

Despite extensive funding, governmental agency support, the employment of professional advertising and public relations firms, and consultation with subject-matter experts, the evidence from the evaluation suggests that the National Youth Anti-Drug Media Campaign had no favorable effects on youths' behavior and that it may even have had an unintended and undesirable effect on drug cognitions and use. This evaluation challenges the usefulness of the campaign as implemented between 2000 and 2004. ∎

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Contributors

R. Hornik had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis; he contributed to the study's concept, design, and supervision; the drafting of the article; and statistical expertise. L. Jacobsohn contributed to the drafting of the article. R. Orwin provided statistical expertise and contributed to the study's concept, design, and supervision. A. Piesse provided statistical expertise. G. Kalton provided statistical expertise and contributed to the study's concept and design. All authors contributed to the analysis and interpretation of data and the critical revision of the article for important intellectual content.

Human Participant Protection

The study protocol was approved by the institutional review board of Westat. Parental permission was obtained to conduct interviews with youthful participants, who gave their consent and were ensured of the confidentiality of all their responses.

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