

Television Campaigns and Adolescent Marijuana Use: Tests of Sensation Seeking Targeting

ABSTRACT

Objectives. This study evaluated the effectiveness of targeted televised public service announcement campaigns in reducing marijuana use among high-sensation-seeking adolescents.

Methods. The study used a controlled interrupted time-series design in 2 matched communities. Two televised antimarijuana campaigns were conducted in 1 county and 1 campaign in the comparison community. Personal interviews were conducted with 100 randomly selected teenagers monthly in each county for 32 months.

Results. All 3 campaigns reversed upward developmental trends in 30-day marijuana use among high-sensation seekers ($P < .002$). As expected, low-sensation seekers had low use levels, and no campaign effects were evident.

Conclusions. Televised campaigns with high reach and frequency that use public service announcements designed for and targeted at high-sensation-seeking adolescents can significantly reduce substance use in this high-risk population. (*Am J Public Health*. 2001;91:292–296)

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Marijuana use among adolescents has become a major public health problem in the United States. According to the annual Monitoring the Future Study, lifetime, annual, and 30-day prevalence of marijuana use rose steeply in the 1990s.¹ For example, lifetime prevalence among 12th graders rose from 32.6% in 1992 to 49.7% in 1999 and nearly doubled among 8th and 10th graders. One recent study concluded that risk of initiation of marijuana use spans the entire course of adolescent development.² Moreover, research has now clearly documented several negative public health consequences and correlates of marijuana use, including lung damage, psychologic and physical dependence, impaired judgment and coordination, reckless driving, depression, and anxiety.^{3,4}

Obviously, more effective ways of reducing marijuana and other illicit drug use must be found. A recent editorial in the *Journal* called for the development of a public health perspective on psychoactive drug use, with primary and secondary prevention as important cornerstones.⁵ Although several prevention modalities have been tried, it is clear that the mass media, especially television, remain major vehicles for disseminating messages directed at preventing drug abuse and other unhealthy behaviors.^{6–8} For example, the largest drug abuse prevention effort in history—The Office of National Drug Control Policy's 5-year, \$1 billion National Youth Anti-Drug Media Campaign—has as its central component the targeted dissemination of televised antidrug (especially marijuana) advertisements and public service announcements.

The effectiveness of such campaigns, especially those that rely primarily on television, is unknown. Unfortunately, attempts to isolate television's effects in public health interventions have had shortcomings in campaign execution or evaluation. Campaigns often fail to ensure widespread, frequent, and prolonged exposure to messages; to target specific audience segments; or to use control communities.⁶ Evaluations of such campaigns typically do not account sufficiently for precampaign and postcampaign trends, although some exceptions exist.^{9–16} Thus, whether television-only campaigns can produce changes in public health behaviors is unknown. This brief addresses this issue with a controlled study of the effects of 3 televised antimarijuana campaigns targeted at adolescents.

Sensation Seeking Targeting (SENTAR) Prevention Approach

The intervention approach tested here revolved around a potent drug use risk factor: sensation seeking. Sensation seeking is a personality trait associated with the need for novel, complex, ambiguous, and emotionally intense stimuli and the willingness to take risks to obtain such stimulation.^{17,18} Persons who rank high in their tendency to seek sensation (high-sensation seekers), relative to those who rank low (low-sensation seekers), are much more at risk for use of a variety of drugs and earlier onset of use,^{17,18} with these relationships documented among adolescents and across long developmental time spans.^{19–23}

High-sensation seekers' needs for stimulation are associated with distinct preferences for high-sensation-value messages, which elicit greater sensory, affective, and arousal responses.^{18,24,25} Such messages are novel, dramatic, emotionally powerful or physically arousing, graphic or explicit, unconventional, fast-paced, or suspenseful. High-sensation-value messages have proven more effective with high-sensation-seeking teenagers and young adults than have low-sensation-value messages in producing intentions to call a prevention hotline, message recall, more negative attitudes toward drugs, and lower behavioral intentions to use drugs.^{24–27} Antidrug public service announcements placed in high-sensation-value television programming also elicit significantly greater attention from high-sensation seekers than do those placed in low-sensation-value programs.²⁸

These findings led to the development of the SENTAR (sensation seeking targeting) prevention approach. This approach includes 4 principles: (1) use sensation seeking as a targeting variable, (2) conduct formative research

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with target audience members, (3) design high-sensation-value prevention messages, and (4) place messages in high-sensation-value contexts (e.g., television programs).

These principles guided a campaign study that found that high-sensation-value public service announcements placed in television programming watched by high-sensation-seeking older teenagers and young adults were effective in persuading this audience to call a drug hotline.²⁹ The current study sought to determine whether SENTAR-based televised public service announcement campaigns could lead to changes in 30-day marijuana use among at-risk adolescents.

Methods

Study Design

The design was a 32-month controlled interrupted time series with switching replications. Antimarijuana public service announcements developed for high-sensation-seeking adolescents were televised from January through April 1997 in Fayette County (Lexington), Ky. Similar campaigns were conducted from January through April 1998 in Fayette County and in Knox County (Knoxville), Tenn. Beginning 8 months before the first Fayette campaign and ending 8 months after the 1998 campaigns, individual interviews were conducted with 100 randomly selected public school students each month in each county (Fayette $n=3174$; Knox $n=3197$). Interviews assessed television viewing and exposure to public service announcements, attitudes toward and use of marijuana and other substances, and various risk and protective factors, particularly sensation seeking. Both population cohorts initially were in grades 7 to 10. Cohorts aged as the study progressed, so marijuana use tended to increase as a result of sociodevelopmental factors. Since teenagers in both counties reflected this secular trend, each county served as an appropriate control for the other.

Samples

The population of Knox County, Tenn (335 000), is about 50% greater than that of Fayette County, Ky (225 000); however, the populations are comparable on demographic and cultural variables. Systematic random sampling with geographic and grade stratification was used in each county to draw 32 monthly pools of potential respondents from enrollment lists of 7th to 10th graders in spring 1996. Because neither school system would allow telephone recruiters to ask for students by name, recruiters asked parents or guardians if a child lived in their household in the specified age

range. If so, the recruiter described the interview (including measurement of drug use) and sought oral permission, first from the parent or guardian and then from the student, to interview the student in the home. Because monthly sample pools were selected in advance, dropouts were not excluded. Written parental consent and student assent were obtained. Interviews were private and anonymous, with self-administration of drug and alcohol items via laptop computer. Respondents received \$10 gift certificates.

Three response rates were estimated for Fayette County. These rates could not be estimated for Knox County because they required separating total refusals into 3 categories not available from Knox. However, the recruiting and interviewing procedures were identical in both counties, and the numbers of completions, refusals, and households with no eligible children in Knox were very similar to the Fayette figures.

The minimal Fayette response rate (35.4%) involved dividing the number of completions by the number of students known (by screening) or estimated (by standard algorithms) to be eligible. Subtracting the *estimated* number of eligible students from the denominator yielded a response rate of 50.8%, the rate among adolescents known to be eligible. Finally, because nonresponse resulting from a child's refusal was most likely to introduce bias in substance use estimates, a third response rate (63.8%) involved dividing the number of completions by the sum of completions and child refusals.

The Fayette and Knox samples matched closely on demographic variables, paralleling census and school population figures. The samples also did not differ significantly on sensation seeking, but the Fayette sample was significantly higher ($P<.001$) on most other drug risk factors (e.g., perceived peer and family drug use, delinquency) and significantly lower ($P<.001$) on most protective factors (e.g., religiosity, perceived sanctions for marijuana use, perceived future opportunities). Fayette County students showed significantly higher levels of use of marijuana, tobacco, alcohol, and hallucinogens, whereas Knox County students showed greater use of inhalants and equivalent rates of cocaine or crack use. Still, levels of marijuana use (and other substance use) by 8th, 10th, and 12th graders in both counties were consistent with national norms reported by the University of Michigan's annual Monitoring the Future Study.¹ For example, mean 30-day marijuana use among 12th graders (as of fall 1997 or fall 1998) was 25.5% for Fayette and 20.3% for Knox, compared with 1997 and 1998 Monitoring the Future national 12th grade estimates of 23.7% and 22.8%, respectively. In any case, the generally small between-

sample differences did not hamper the ability to relate substance use trends to the campaigns.

Public Service Announcement Development

Formative research with focus groups of high-sensation-seeking adolescents yielded opinions on existing antidrug public service announcements and discussions of marijuana risks. All public service announcements developed for the campaigns used teenage actors; employed high-sensation-value characteristics such as novelty, drama, surprise, and strong emotional appeal; and depicted several negative consequences of marijuana use. Risks incorporated were supported by previous research sponsored by the National Institute on Drug Abuse³ and were considered salient by the focus groups (e.g., effects on relationships, loss of motivation or coordination, lung damage, impaired judgment). Advertisement storyboards were evaluated by additional focus groups. Revisions based on these evaluations were incorporated into 5 professionally produced 30-second television spots used in all 3 campaigns. A more detailed description of the spots is available elsewhere.³⁰

The Television Campaigns

A media buyer purchased time from local television stations and companies, who also donated substantial public service announcement time. Spots were placed in programs that our survey indicated were watched by high-sensation-seeking adolescents. An average of 777 paid spots and 1160 unpaid spots were aired per campaign. According to standard advertising formulas, at least 70% of the targeted age group were exposed to a minimum of 3 campaign advertisements per week. Advertisement recall data from the monthly surveys indicated even higher exposure (>80%), particularly among high-sensation seekers.

Measures

Sensation seeking was measured with the Brief Sensation Seeking Scale, which includes 8 statements (e.g., "I prefer friends who are excitingly unpredictable") to which respondents indicated extent of agreement on 5-point Likert scales. The scale showed good reliability ($\alpha=.78$) and predicted drug use, drug attitudes, and various drug risk and protective factors.³¹ The dependent variable was the percentage of each monthly sample reporting marijuana use in the last 30 days. Expressing use in terms of prevalence allowed comparison with national norms.¹ This measure also reflects recent drug use and thus can be sensitive to campaign effects. Thirty-day use of alcohol, tobacco, and

other substances was measured as control constructs, along with several risk and protective factors evaluated extensively in other studies.³²

Results

Respondents whose score on the Brief Sensation Seeking Scale was higher or lower than full-sample medians (with age, sex, and race/ethnicity taken into account to reduce possible item bias) were designated high- and low-sensation seekers, respectively. To reduce sampling error and negative autocorrelation, we adjusted mean monthly estimates of 30-day marijuana use for 12 risk and protective factors that showed the strongest zero-order correlations with individual 30-day use. The adjusted monthly means were analyzed with a regression-based time-series procedure amenable to time series with fewer than 50 data points.³³

As expected, analyses involving low-sensation seekers found low levels of 30-day marijuana use, no developmental trends, and no campaign effects in either county. Initial regression analyses of means for high-sensation seekers showed 2 outliers in the Fayette County series and 1 in the Knox County series. Following standard guidelines,^{34,35} these were removed. Other procedures for addressing outliers without removal (e.g., logarithmic transformations³³) produced similar results. Regression plots for both counties are shown in Figure 1.

Knox County Time Series

The time-series regression model with terms for all slope and intercept changes was significant ($P < .001$; adjusted $R^2 = .442$, with very low autocorrelation, $\rho = .032$). Unlike low-sensation seekers, high-sensation seekers showed an upward developmental trend in 30-day marijuana use of 0.84% per month ($P < .001$) over the 20-month campaign period, for a total estimated absolute precampaign increase in use from 16.6% to 33.0%. This was followed by a significant downward change in slope immediately after the start of the campaign ($P = .001$), with the decline in use continuing to the completion of data gathering.

Fayette County Time Series

A series of regression analyses was required to clarify a more complex pattern of results because of the use of 2 campaigns in Fayette County and an apparent wearing off of the effects of the first campaign. The first regression model containing all slope and inter-

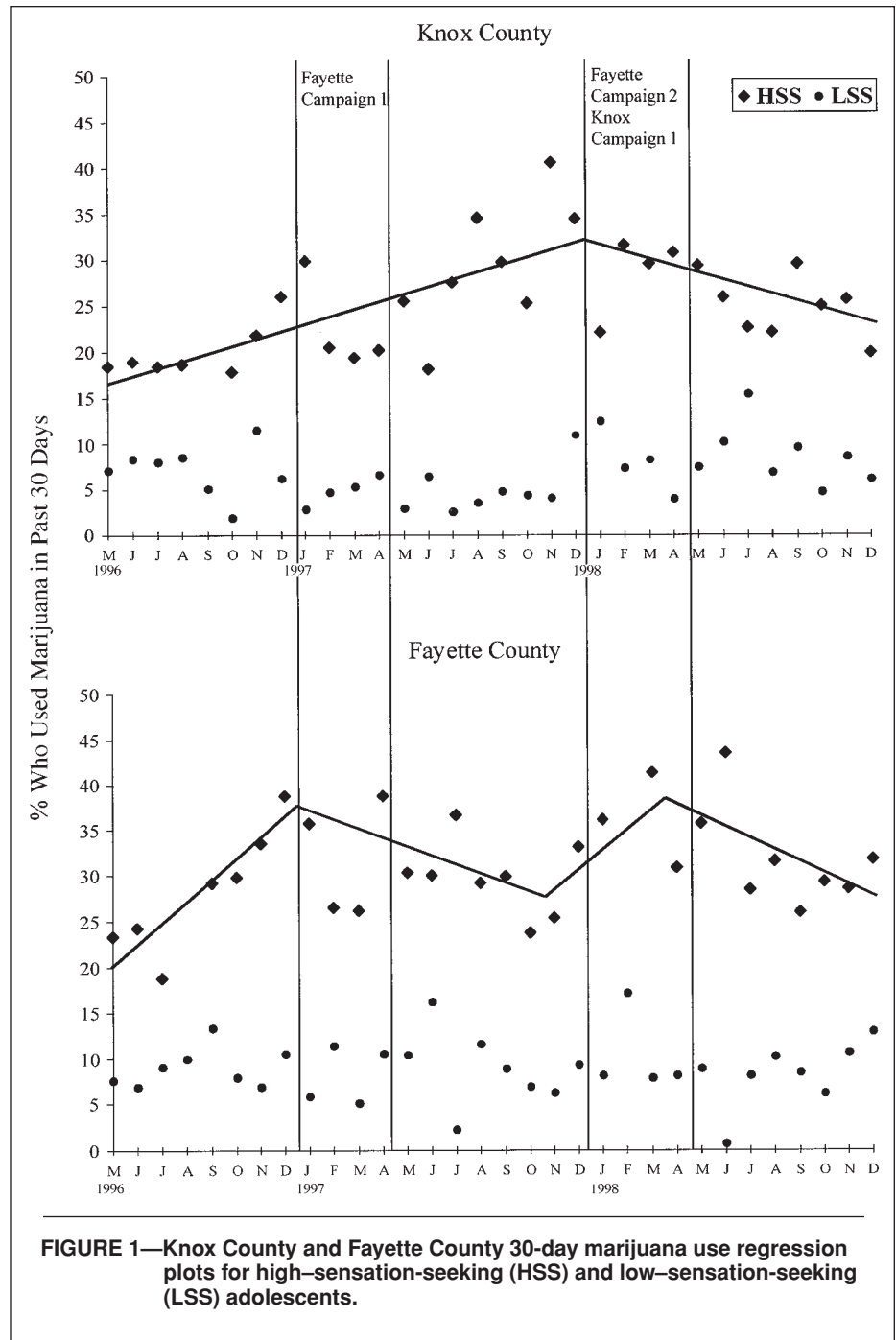


FIGURE 1—Knox County and Fayette County 30-day marijuana use regression plots for high-sensation-seeking (HSS) and low-sensation-seeking (LSS) adolescents.

cept change terms was significant ($P < .007$; adjusted $R^2 = .351$, with acceptable autocorrelation, $\rho = -.243$).

The downward change in slope at the start of campaign 1 was significant ($P = .002$). However, the effects of campaign 1 appeared to wear off after approximately 6 months. The shape of the wear-off trend (often observed in product advertisement campaigns) suggested that this portion of the time series would be more appropriately modeled as a linear regression line than as an intercept change. A model incorporating this change and also re-

moving the nonsignificant first intercept change term was statistically significant ($P = .003$), with a higher R^2 (.384) and lower autocorrelation ($\rho = -.14$) than the original model. The change in slope at the start of campaign 1 was significant ($P = .001$), as were the shift from the downward post-campaign 1 trend to the upward wear-off trend ($P = .003$) and the negative slope change from the wear-off trend to the post-campaign 2 period ($P = .002$). This model is depicted in Figure 1. A more detailed discussion of the analyses and campaign effects is available elsewhere.³⁰

Discussion

Although research generally has shown that media campaigns coupled with other kinds of interventions are the most successful,^{7,14,15} this study's results add to documentation that media campaigns alone can have significant effects on public health behaviors.^{10,36-38} All 3 campaigns resulted in significant reductions in marijuana use in high-sensation-seeking adolescents. In Knox County, effects still were evident several months after the campaign. There, the estimated drop in the relative proportion of high-sensation seekers using marijuana was 26.7%. Additional analyses (not included for space reasons) also indicated that campaign effects were specific to marijuana use, with no effects on use of tobacco, alcohol, inhalants, cocaine or crack, or hallucinogens. The effects thus cannot be ascribed to overall drug use trends.

These findings do not indicate that all anti-drug public service announcements will produce behavior change or that public service announcements alone should be the only avenue to prevention. However, with carefully targeted campaigns that achieve high levels of reach and frequency, and with messages designed specifically for the target audience on the basis of social scientific theory and formative research, we believe that public service announcements can play an important role in future drug abuse prevention efforts. □

Contributors

P. Palmgreen, L. Donohew, E. P. Lorch, R. H. Hoyle, and M. T. Stephenson planned and executed the study, including development of both the questionnaire and the public service announcements. P. Palmgreen and M. T. Stephenson analyzed the data. P. Palmgreen and E. P. Lorch took primary responsibility for the writing of the paper, although all authors contributed to revisions.

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