



Published in final edited form as:

Addict Behav. 2011 ; 36(1-2): 116–124. doi:10.1016/j.addbeh.2010.09.005.

Potential Exposure to Anti-Drug Advertising and Drug-Related Attitudes, Beliefs, and Behaviors among United States Youth, 1995-2006

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Abstract

Using nationally representative data from the Monitoring the Future Study on United States middle and high school students, we related exposure to anti-drug television advertising as measured by Nielsen Media Research ratings points to student self-reported drug-related outcomes from 1995-2006. Multivariate analyses controlling for key socio-demographics and accounting for the complex survey design included 337,918 cases. Results indicated that attitudes, beliefs, and behaviors regarding substance use were significantly related to such advertising exposure over the six months prior to the date youth were surveyed. However, the observed relationships varied by grade level, over time and by advertising tagline and marijuana focus. Findings differed markedly between middle and high school students across the study interval. One factor that may partially explain observed differences may be variation in the degree to which the ads focused on marijuana. Putting a concerted effort into increasing anti-drug advertising will likely increase the exposure to and recall of such ads among youth. However, the likelihood that such advertising will result in youth being less likely to use drugs seems to depend heavily on the type of advertising utilized and how it relates to different ages and characteristics of targeted youth.

Keywords

marijuana; media campaign; youth; substance use; television advertising

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Contributors: Yvonne Terry-McElrath undertook the statistical analysis and completed the first draft of the manuscript. Sherry Emery designed the study and wrote the protocol. Glen Szczypka managed all Nielsen data cleaning, coding, and preparation, assisted with the methodology section. Lloyd Johnston, as principal investigator of Monitoring the Future, developed many of the measures used. All authors have contributed to and have approved the final manuscript.

Conflict of Interest: All authors declare they have no conflicts of interest.

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1. Introduction

Efforts to reduce substance use (and related crime and public health costs) often focus on preventing or reducing use among youth given that substance use usually starts before adulthood, and use at an early age is associated with problematic health and social outcomes in adulthood (Anthony & Petronis, 1995; Horgan et al., 2001; Johnston et al., 2009). A key component of many prevention efforts is a media campaign. Mass media campaigns can deliver prevention messages to a wide audience at a relatively modest cost per person reached. If even small desired effects are obtained, the significant numbers of individuals possibly affected can result in a very cost-effective intervention (Derzon and Lipsey, 2002). However, evaluations of national-level anti-drug ad campaigns are limited; those that are available have usually been able to focus only on a short time span and a single campaign.

The current paper will expand the evidence base by combining ratings data for US anti-drug television advertising from 1994-2006 with nationally representative data from 8th, 10th, and 12th grade students during the same time periods. During these years, two major anti-drug advertising campaigns were occurring. Public service announcements produced and sponsored by the Partnership for a Drug-Free America were on-going throughout the study. Starting in 1998, the US Office for National Drug Control Policy phased in the National Youth Anti-Drug Media Campaign. Analyses will examine (a) if self-reported recall of broadcast advertising during these years was related to exposure to anti-drug ads as measured by ratings data; (b) if self-reported drug-related attitudes and beliefs were related to levels of anti-drug ad exposure; (c) if self-reported drug use prevalence was related to anti-drug ad exposure; and (d) if the above relationships varied by campaign phase, advertising tagline, marijuana focus, or youth sensation-seeking levels.

1.1 A Brief History of Anti-drug Advertising Campaigns in the US

1.1.1 1987 to Early 1998: The Partnership Campaign—The Partnership for a Drug-Free America (PDFA) was founded in 1986 as a non-profit coalition of communication professionals whose mission is to reduce drug use in the US (American Association of Advertising Agencies, 2004). The first PDFA anti-drug advertising began airing in April 1987 (Schilling and McAlister, 1990), and the campaign was the primary source of US anti-drug advertising from 1987 until mid-1998 when the National Youth Anti-Drug Media Campaign began airing nationally (see Figure 1). PDFA campaign ads were primarily broadcast using donated air time, and created pro-bono by a coalition of participating advertising agencies. The specific focus of PDFA advertising has evolved with changing trends in substance use among US adolescents. Its focus on illicit drug use in general (1987-1991) widened to include campaigns focused on drug use among urban youth (early 1990s), inhalants (1995), heroin (1996), and Ecstasy (2001) (American Association of Advertising Agencies, 2004). No studies have been published that relate actual PDFA ad ratings data with drug-related outcomes. However, two large studies have been published that evaluated the campaign in its early years.

The first published study of the PDFA campaign involved four age groups (ages 9-12, 13-17, college students, adults) approximating the US national population. This study showed that respondents in all age groups who lived in media markets with higher levels of PDFA advertising became more strongly anti-drug in their attitudes than did individuals in lower exposure media areas (Black, 1991). A later study by Block and colleagues in 2002 was based on adolescent recall of antidrug advertising using the first four years of nationally-representative data (1987-1990) from the Partnership Attitude Tracking Survey. Findings showed that ad recall was associated with lower prevalence of marijuana and cocaine/crack use but not frequency of use among users.

1.1.2 Mid-1998 to 2006: The National Youth Anti-Drug Media Campaign—After nearly a decade of steady declines in illicit drug use among US youth, rates began to climb during the 1990s, reaching 40% among high school seniors in 1996 (Johnston, et al, 2009). In response, the US Congress awarded the Office of National Drug Control Policy (ONDCP) nearly \$1 billion between 1998 and 2004 for the National Youth Anti-Drug Media Campaign (hereafter referred to as the NYADMC) (Hornik et al., 2008). The initial focus of the NYADMC was to prevent substance use initiation and encourage occasional users to discontinue use (Kelder et al., 2000). The NYADMC involved both paid and donated media resources, and the campaign initially prioritized targeting youth aged 11-13 but also targeted parents and other influential adults. The NYADMC ads were developed with the assistance of PDFA, and a six-month pilot-testing phase using already-existing PDFA campaign ads was begun in January 1998 in 12 media markets. The campaign went national in mid-1998, and by that fall had reached full implementation using newly-created ads (see Figure 1). The initial campaign aired through early 2002, and the majority of ads during that time targeted drug use in general (Hornik et al., 2008). After 2002, the campaign underwent several strategic shifts in focus. In October 2002, the NYADMC introduced the Marijuana Initiative, which targeted 14-16 year-olds and emphasized the negative consequences of marijuana use (Hornik et al., 2003) using ads that were high in sensation value (Harrington, 2007). In February 2004, the Early Intervention initiative began to air concurrently with the Marijuana Initiative with ad messages aimed at helping youth intervene with drug-using peers (Hornik et al., 2008). From July 2000 through October 2005, the NYADMC campaign used the brand, “My Anti-Drug”. However, in November 2005, the NYADMC was rebranded “Above the Influence” and again significantly refocused. Above the Influence has emphasized social influences and pressures related to drug use initiation and continuation (ONDCP, 2009) with the youth component of the campaign primarily targeting prescription drugs, marijuana, and alcohol (ONDCP, 2010).

Congress required an evaluation of the NYADMC as part of the funding agreement. A series of detailed evaluation reports were completed and are available on the NIDA website <http://www.drugabuse.gov/about/organization/despr/westat/>. The evaluation found that recall of the NYADMC was strong among parents and youth; however, there was little evidence of direct favorable effects on youth (Orwin et al., 2006). In fact, exposure was associated with increased intentions to use marijuana, increased social approval of marijuana use, and increased likelihood of initiating marijuana use (Hornik et al., 2008). Clearly, such results were not what the NYADMC had set out to accomplish. The US Senate Appropriations Committee requested that the US Government Accountability Office (GAO) review the Westat evaluation conclusions. The GAO (2006) concluded that the methods used for the Westat evaluation were credible, and its conclusions regarding the NYADMC were supported both for the NYADMC overall as well as the late 2002-2004 time period when the NYADMC refocused on marijuana. In contrast to the Westat evaluation, a smaller study of the NYADMC among youth aged 13-17 in two communities indicated that Marijuana Initiative advertising was related to reductions in pro-marijuana-related attitudes and beliefs among high sensation-seeking youth as well as reversing upward developmental marijuana use trends (Palmgreen et al., 2007). However, no relationships were observed for low-sensation-seeking youth.

In responding to the 2006 GAO report, the Director of ONDCP stated that the basic methodology used in the Westat evaluation was flawed and called for research relating media market campaign exposure to self-reported youth behaviors (GAO, 2006). The ONDCP Director also raised concerns that the longitudinal, in-home data collection that was used for the initial evaluation may have pre-disposed respondents to participate in such behaviors, whereas cross-sectional surveys would have less of a tendency for such effects. ONDCP also noted that research was needed that accounted for possible differences in results based on youth levels of sensation-seeking given the results of the Palmgreen et al. (2007) study.

The current paper is positioned to significantly add to the literature available on national anti-drug advertising by presenting the results from analyses following the form suggested by ONDCP. Using nationally representative cross-sectional data from the Monitoring the Future Study on US 8th, 10th, and 12th grade students, we relate exposure to anti-drug television advertising as measured by Nielsen Media Research ratings points to a variety of student self-reported drug-related outcomes. These analyses include PDFA-only campaign years (1994 to early 1998), as well as the initial NYADMC years of mid- 1998-2002 and revised NYADMC campaigns from 2003-2006. Overall anti-drug ad exposure, as well campaign-specific exposure, will be investigated.

2. Methods

The methods used for this analysis are modeled on those used in recent nationally representative studies of US anti-tobacco advertising media campaigns (Emery et al., 2005; Wakefield et al., 2006; Terry-McElrath et al., 2007).

2.1 Sample and Data Collection

2.1.1 Advertising Exposure Data—Commercial television ratings data were obtained from Nielsen Media Research. These data provide information on mean audience exposure for youth aged 12-17 to all anti-drug advertising sponsored by either PDFA or ONDCP from 1994-2006 that appeared on Nielsen Monitor-Plus monitored network and cable television distributions nationally and for local spot, clearance, and syndication television. From 1994-1996, Nielsen tracked such ratings in the largest 50 media market areas in the US. In 1997, Nielsen expanded detailed tracking to the top 75 market areas in the US. The top 75 markets encompassed 78% of American television viewing households (Nielsen Media Research, 2002). Advertising ratings were aggregated by month, year and market. The methods for these activities were the same as those previously used with Nielsen anti-tobacco advertising data, and a detailed description of the methodology is available elsewhere (Szczyepka et al., 2003).

Nielsen ratings provide an estimate of the percentage of households with televisions watching a program (or ad within a program) in a media market over a specified time period (Emery et al., 2005). The current paper uses targeted ratings points (TRPs) for 12-17 year olds, which estimate ad reach and frequency for 12-17 year old viewers. TRP values indicate the estimated percentage of the target audience that viewed any specified material. For example, if an ad received 50 TRPs per month, that ad is estimated to have been viewed an average of 1 time in the past month by 50 percent of the 12-17 year olds in the specified media market. TRPs are averages; individuals may have higher or lower exposure based on personal television viewing behavior.

Nielsen did not record ad creative titles in their ratings data prior to 1998. Nielsen recorded a total of 84,722 anti-drug ad broadcasts from 1998-2006, and 99% were identified by 841 creative titles. Video files for all of the 841 creative titles were requested from Nielsen and reviewed by study staff; coding was possible for 749 of the files (89%). Each video file was coded for the tagline used which usually appeared at the end of the ad assigning ad sponsorship along with a campaign slogan. Three taglines were observed (Partnership, ONDCP, or combined ONDCP/PDFA), and each ad was assigned a single tagline code. As the NYADMC did broadcast nationally until late 1998, ads from 1994-1997 were coded for Partnership tagline although video files were not available. Video coding also allowed 1998-2006 ads to be coded for marijuana focus. Ads were coded as marijuana-focused if marijuana was the only substance targeted. If marijuana was not targeted, or if multiple substances were targeted including marijuana, the ad was coded as non-marijuana-focused. Coding was completed by one research

assistant and one of the primary authors of this paper (GS). Training was provided to the research assistant, and periodic reviews for accuracy were completed.

2.1.2 Student Data—Data on 8th-, 10th-, and 12th- grade student illicit drug-related attitudes, beliefs, and behaviors from 1994–2006 were obtained from the Monitoring the Future (MTF) study (Johnston et al., 2009). Detailed information on MTF multi-stage complex survey sampling and data collection procedures are available elsewhere (Johnston et al., 2009). MTF data are collected from February to June of each year, with samples for each grade drawn to be representative of all students in the specified grade for the 48 contiguous states. All MTF surveys were self-completed in group-administered school settings.

2.1.3 Sample—Individual MTF student data (weighted N=624,754) were merged with Nielsen ratings data for the top 75 market areas using state and county Federal Information Processing Codes (Information Technology Laboratory, 2008) to identify the geographic location of the student's school and the Nielsen media markets. The resulting file included 462,607 weighted cases. These cases represented 76 percent of all possible MTF cases in 73 of the top 75 market areas (MTF does not survey students in Hawaii and thus no students in the Honolulu market area were included; one additional top 75 media market did not have student surveys).

Examining differences between MTF cases that were and were not in the top 75 media markets, no substantive and significant differences were found for any drug-related outcome measures or levels of student-reported anti-drug advertising exposure. Substantively significant differences were observed for student race ethnicity (students outside of top 75 market areas were more likely to report white race/ethnicity than those within top 75 market areas; 70% vs. 64%), region (top 75 market area students less likely to be in the Midwest and South, and more likely to be in the Northeast and West), and average parental education (71% of students in top 75 market areas had one or more parent graduate from college vs. 67% of other students). However, such differences might be expected given that urban areas would be represented more often in top 75 market areas.

2.2 Measures

2.2.1 Dependent Variables—The following six dependent variables were obtained from student self-report data and focused on drug-related beliefs, attitudes, and behaviors, as well as recall of anti-drug related advertising:

1. Ad recall: “The next questions ask about anti-drug commercials or “spots” that are intended to discourage drug use. In recent months, about how often have you seen such anti-drug commercials on TV, or heard them on the radio?” Response categories ranged from 1=not at all to 6=more than once a day. Data were recoded into a dichotomous measure where 1= at least once a week vs. 0=less frequently.
2. Disapproval of marijuana use: “Do YOU disapprove of people...smoking marijuana regularly” with response options of 1=don't disapprove, 2=disapprove, 3=strongly disapprove. Data were recoded into 1=any disapproval vs. 0=no disapproval.
3. Perceived risk of marijuana use: “How much do you think people risk harming themselves (physically or in other ways), if they smoke marijuana regularly?” Answer categories included 1=no risk to 4=great risk. A dichotomous variable of 1=great risk vs. 0=other was created.
4. Perceived ease of obtaining marijuana: “How difficult do you think it would be for you to get [marijuana (pot, weed)], if you wanted some?” Response categories

included 1=probably impossible to 5=very easy. Data were recoded such that 1=fairly/very easy vs. 0=other.

5. Past 30-day marijuana use: “On how many occasions (if any) have you used marijuana (weed, pot) or hashish (hash, hash oil) during the last 30 days?” Response options ranged from 1=0 occasions to 7=40 or more. An any/none prevalence measure was created.
6. Past 30-day illicit drug use other than marijuana (IOTM): MTF asks students about the use of a variety of illicit drugs other than marijuana using the same question stem noted for marijuana, and then recodes the data into a dichotomous any/none measure indicating any such use during the past 30 days. For 12th graders, IOTM includes LSD, other hallucinogens, crack, other cocaine, heroin and/or any use of other narcotics, amphetamines, sedatives, or tranquilizers not taken under a doctor's orders. For 8th and 10th graders, measures of use of other narcotics and sedatives are considered unreliable and have been excluded (see Johnston et al., 2009).

2.2.2 Independent Variables—Monthly TRP totals were aggregated for each student based on the survey date for their MTF school to form a sum of the 6 previous months of ratings for the media market in which they resided. We scaled this sum by 100 to indicate the mean number of times advertising potentially was seen by 100% of youth aged 12-17 in each market area in the six months preceding MTF survey administration. The following 6-month TRP sums were created: (a) total anti-drug advertising, (b) ONDCP tagline advertising, (c) Partnership tagline advertising, (d) combined ONDCP/PDFA tagline advertising, (e) marijuana-focused advertising, and (f) non-marijuana-focused advertising.

2.2.3 Control Variables—Multivariate models controlled for a variety of factors known to relate to illicit drug use among youth: gender, grade, student race/ethnicity, academic achievement (measured using grade point average), college plans, region of the US, parental education (used as a proxy for family socio-economic status), truancy, nights out during the week for fun and recreation, and income. Sensation seeking (used in models examining advertising during the Marijuana Initiative) was a mean of two items from the MTF survey: (a) “I get a real kick out of doing things that are a little dangerous”, and (b) “I like to test myself every now and then by doing something a little risky.” For both, response options range from 1=disagree to 5=agree and have been recoded to indicate high sensation seeking (4 or 5) versus other (1-3). Models also controlled for social trends in drug-related behaviors and beliefs with two-year time dummies. Three distinct dummy variables indicating campaign phase were also used: 1995-1998 (PDFA-only years),¹ 1999-2002 (initial NYADMC phase), and 2003-2006 (NYADMC Revised Phases beginning with the Marijuana Initiative). The inclusion of both two-year dummy terms and campaign phase dummies was critical in order to account for the potentially confounding effects of social trends versus campaign phase relationships.

2.3 Analyses

After restricting cases to only those with valid data for (a) total anti-drug advertising, (b) at least one outcome, and (c) the key socio-demographic controls noted above, a total of 337,918 weighted cases remained for multivariate analysis. Data were weighted to adjust for differential probability of school and student selection in the MTF study, and analyses were corrected for the complex clustered sampling design effects using the svy: mean and logistic commands in Stata 10.1 (weighted correlations were run using the corr command). In all multivariate models, the six-month TRP sums have been scaled by 10 to allow for more meaningful odds ratios

¹Given that MTF surveys are conducted from February through early June, 1998 MTF cases can be classified as PDFA-only given that the NYADMC did not go national with full implementation till the fall of 1998.

(ORs) and confidence intervals. Thus, ORs indicate the change in odds relative to 10-unit changes in the mean number of times advertising potentially was seen by 100% of youth aged 12-17 in each market area in the six months preceding MTF survey administration.

Given that the NYADMC targeted specific age groups, models first were run separately by grade. However, results showed few differences between 10th and 12th grade. Thus, results are shown for middle school (8th) and high school (10th and 12th combined). Total advertising, tagline advertising, and marijuana-focus advertising were modeled separately. For each outcome, models were first run using advertising as the independent variable with no campaign phase interactions; then, advertising with campaign phase interactions was tested. If the campaign phase interactions were significant ($p \leq .01$), separate models were then run by campaign phase. Finally, we also explored the relationships between anti-drug advertising and the outcomes of interest among high sensation-seeking youth compared to lower sensation-seekers. Due to the large number of models run, a p -value of $\leq .01$ was set to determine statistical significance for all multivariate regression models.

3. Results

Table 1 presents descriptive statistics of all measures used in analyses. Over the six months prior to the MTF survey, youth were potentially exposed to an average of 34 anti-drug television ads. However, average potential exposure varied significantly over time and across media markets, from only a single ad to almost 90. Examining total potential anti-drug advertising exposure by ad tagline, youth were potentially exposed to an average of 20 ads with a tagline that combined ONDCP and PDFA, an average of 10 ads with Partnership-only tagline, and an average of 3 ads with ONDCP-only tagline over the six months preceding the date students took the MTF survey. Youth were potentially exposed to equal averages of marijuana-focused and non-marijuana-focused ads (19 for both).

3.1 Trends in Potential Anti-Drug Advertising Exposure

Figure 2 presents trends over time in potential exposure to total anti-drug advertising as well as student self-reported recall of such advertising and past 30-day substance use. During the PDFA-only campaign years (1995-1998), the mean level of potential exposure to anti-drug advertising in the past six months was clearly decreasing from a high of 25 in 1995 to a low of 13 in 1998. During these years, trends in student self-reported recall of anti-drug advertising on TV and/or radio also showed a decline, with yearly average middle and high school student recall levels strongly correlated (Pearson $r = .89$; $p = .04$). The figure also clearly shows the significant increase in potential anti-drug advertising exposure that resulted from the initiation of the NYADMC campaign. Co-occurring trends in student self-reported anti-drug ad recall showed that recall among middle school youth increased at a faster rate than for high school youth in 1999 (and remained significantly higher through 2001). During these years, yearly average recall levels between middle and high school youth were not significantly correlated. The strong increase for middle school youth may have indicated that initial NYADMC efforts to target younger youth (ages 11-13) were successful. Recall levels for high school students strongly increased in 2002; however, recall began declining sharply in 2004 for middle school youth and in 2005 for high school youth. From 2003-2006, yearly average recall levels for middle and high school youth were again strongly correlated ($r = .97$; $p = .03$). Substance use trends show that marijuana use peaked in 1996 and then began a gradual decline that intensified starting in 2002. IOTM use peaked in 1995 and then remained fairly stable till 2002, when a gradual decline became evident.

Figure 3 presents time trends for tagline-specific and marijuana focus potential anti-drug advertising exposure and student self-reported anti-drug advertising recall. Partnership tagline advertising alternated in strength with combined ONDCP/PDFA tagline advertising. ONDCP

tagline advertising was less prominent, with potential six-month exposure levels of five ads or more found only for 2002-2004. ONDCP tagline advertising exposure reached a high of 10 ads in 2004. Trends in non-marijuana-focused and marijuana-focused advertising are also shown in Figure 3 and show strong variation in the extent to which anti-drug advertising focused on marijuana. Marijuana-focused advertising did increase sharply in 2003 and 2004 (during the Marijuana Initiative).

3. 2 Potential Anti-Drug Advertising Exposure and Drug-Related Outcomes

Table 2 presents the results of multivariate models relating potential exposure to anti-drug advertising and drug-related outcomes among middle school students while results for high school students are shown in Table 3. Due to space limitations, the effects of included covariates are not presented. [To the editor and reviewers: if it is deemed essential to report the effects of covariates, we suggest providing results for select models in tables available as supplementary internet material].

3.2.1 Recall—For both middle and high school students, self-reported recall of anti-drug ads on TV or radio was significantly and positively associated with total anti-drug advertising (OR 1.11 for middle school, and 1.10 for high school). However, the strength of this relationship among middle school students differed significantly by campaign phase: the significant positive relationship between total ad exposure and recall was only evident for middle school students during 1995-1998 (the PDFA-only campaign phase).

Recall for middle school students was marginally related to higher levels of both ONDCP tagline (OR 1.18; $p=.022$) and Partnership tagline (OR 1.05; $p=.024$) advertising. Among high school students, higher levels of ONDCP tagline advertising were associated with increased recall (OR 1.29). While ONDCP tagline advertising accounted for a relatively small share of total anti-drug advertising, it increased in a relatively linear fashion through 2004, decreasing thereafter. During 2004, higher levels of advertising with an ONDCP tagline were associated with the highest recall level observed during the time period of the current study.

For both middle and high school students, recall of anti-drug ads on TV or radio was significantly and positively associated with potential exposure to marijuana-focused anti-drug advertising (OR 1.07 for middle school and 1.10 for high school).

3.2.2 Marijuana-Related Attitudes and Beliefs—Across campaign phases, disapproval of using marijuana regularly increased significantly with total anti-drug advertising for middle school students (OR 1.05). The likelihood of perceiving great risk in using marijuana regularly and the perceived ease of obtaining marijuana were unrelated to total anti-drug advertising for middle school students. No robust relationships between advertising tagline and middle school marijuana-related attitudes and beliefs were observed. However, marginal significance was found for higher exposure to combined ONDCP/PDFA tagline advertising and higher odds of disapproving of regular marijuana use (OR 1.12; $p=.015$) and increased perceived risk of regular marijuana use (OR 1.08; $p=.028$).

Among high school students, there was a significant positive relationship between total anti-drug advertising and disapproval of marijuana use for the PDFA-only campaign phase from 1995-1998 (OR 1.09). In addition, for high school students, total anti-drug advertising during the PDFA-only campaign phase was significantly related to increased odds of perceived risk of marijuana use (1.06) and decreased odds of perceiving marijuana to be easy to obtain (OR 0.90). These findings were echoed in the tagline analyses where higher levels of Partnership tagline advertising were associated with increased disapproval of using marijuana regularly (OR 1.06) and decreased perceived ease of obtaining marijuana (OR 0.93). However, during the NYADMC revised phase (2003-2006), relationships among high school students reversed.

Higher total anti-drug advertising was associated with adverse relationships of decreased perceived great risk in marijuana use (OR 0.94) and increased perceived ease of obtaining marijuana (OR 1.09). To further investigate these adverse relationships, interaction models were run with tagline advertising and campaign phase among high school students (data not shown). Results showed no significant interactions for ONDCP or PDFFA taglines. However, combined ONDCP/PDFA tagline advertising showed significant and adverse interaction estimates with 2003-2006 compared with 1999-2002 for disapproval of using marijuana regularly and perceived risk of using marijuana. During 2003-2006, higher combined ONDCP/PDFA advertising was associated with significantly decreased perceived risk of using marijuana (OR 0.87; $p=.005$) and marginally decreased disapproval of regular marijuana use (0.89; $p=.038$).

Middle school student disapproval of using marijuana regularly increased significantly with marijuana-focused advertising (OR 1.10). Marginal relationships between middle school perceived risk of marijuana use and marijuana-focused ads were also observed (OR 1.06; $p=.031$). In contrast, potential exposure to non-marijuana-focused advertising was unrelated to middle school marijuana-related attitudes and beliefs. Neither non-marijuana-focused nor marijuana-focused advertising showed relationships with high school student attitudes or beliefs.

3.2.3 Substance Use—There were no significant relationships between total anti-drug advertising and middle school marijuana or IOTM use (the odds of marijuana use were marginally negatively related; OR 0.96, $p = .049$). For high school students, higher total anti-drug advertising during 1995-1998 was associated with significantly decreased odds of marijuana use (OR 0.93). Higher total anti-drug advertising was related to lower odds of IOTM use (OR 0.96) among high school students, with no evidence of campaign phase differences.

Tagline advertising was not significantly related to the odds of middle school substance use although the odds of any past-30-day marijuana use marginally decreased with increasing levels of combined ONDCP/PDFA tagline advertising (OR 0.88; $p=.036$). In contrast, the odds of both marijuana use and IOTM use among high school students was significantly and negatively related to Partnership tagline advertising (OR 0.94 for marijuana; 0.92 for IOTM).

Marijuana-focused advertising among middle school students was associated with decreased odds of marijuana use (OR 0.89). No such relationships were observed for high school students.

3. 3 Moderating Effects of Sensation-Seeking

In order to examine if youth levels of sensation seeking moderated the relationship between advertising and substance-related outcomes, we conducted analyses that interacted sensation-seeking with potential exposure to anti-drug advertising during 2003-2006 (the campaign phase during which the Marijuana Initiative was airing). Results (not shown) indicated no significant differences in findings among middle or high school students by sensation seeking.

4. Discussion

Our analyses examined relationships between potential exposure to televised national anti-drug advertising from 1995-2006 and a variety of outcomes related to illicit substance use among US middle and high school youth. American youth were clearly aware of the anti-drug advertising occurring in the media around them. Two-thirds of all youth reported seeing anti-drug ads on TV or hearing them on the radio at least weekly in recent months, and the odds of such recall were significantly and positively related to total and marijuana-focused anti-drug advertising. While anti-drug advertising showed desired relationships (from a public health viewpoint) with many of the outcomes examined in this study, analyses indicated complex

differences by grade level, campaign phases, advertising tagline and marijuana focus. Marijuana-focused advertising appeared to be effective among middle school youth, with indications that such advertising with the combined ONDCP/PDFA tagline was especially relevant. In contrast, high school youth presented a very different set of relationships. Advertising with the Partnership tagline appeared to work particularly successfully with high school youth, while combined ONDCP/PDFA tagline advertising appeared to have some undesirable relationships during 2003-2006.

In sum, the effectiveness of different campaigns appeared to change over time and to resonate very differently across populations of youth. Why? Research on anti-tobacco media campaigns has found very clear differences in relationships between youth-targeted advertising exposure and tobacco-related attitudes/beliefs/behaviors based on media campaign sponsor (Davis et al., 2009; Wakefield et al., 2006). Thus, the differences found in the current paper based on tagline are not without precedent. Although the ads used by the NYADMC are produced in partnership with the PDFA, it is important to recognize that the content, theme, and target audiences of NYADMC ads are informed by very specific behavioral theory (ONDCP, 2009) and input from the Media Campaign Advisory Team, an expert panel of outside scientists (see <http://www.mediacampaign.org/about.html>). Thus, ads developed for the NYADMC and identified by either the ONDCP or combined ONDCP/PDFA taglines could be expected to differ significantly from those developed by PDFA alone.

One factor that appears to partially explain observed differences is variation in the degree to which the different taglines included ads focused on marijuana. Clearly, very strong differences in substance focus occurred within taglines over time. One study with US 5th-12th grade students in ten schools across four states examined 30 antidrug ads produced by the PDFA for relationships between youth-rated perceived effectiveness and ad characteristics. Results showed that ads focused on methamphetamine or heroin were highly related to perceived effectiveness. Ads focusing on marijuana were perceived to be generally less effective, although not all were rated poorly (Fishbein et al., 2002).

Anti-tobacco media campaign research has found that advertising campaign sponsor significantly predicted the range of ad themes and executional characteristics used in ads, and that youth comprehension, appraisal, recall, and engagement with advertising were all significantly related to the themes and executional characteristics used (Terry-McElrath et al., 2005). Coding the anti-drug ads for ad theme and executional characteristics was beyond the scope of the current study. However, the Fishbein et al. (2002) study also examined PDFA ads for characteristics such as dramatic representation, realism, amount learned, negative and positive emotion, and mediating constructs such as self-efficacy and self-esteem. Results showed that ads coded for realism, learning, and negative emotional response were highly related to perceived effectiveness (Fishbein et al., 2002), as were ads focused on the negative consequences of drug use. In contrast, ads focusing on positive emotional response and avoidance behaviors were perceived to be least effective. Fishbein and colleagues found that both age and gender significantly influenced ratings of ad effectiveness. Their study did not provide information on ad tagline or when the specific ads aired. However, it emphasizes the important variation that can occur within and across anti-drug advertising campaigns by theme and executional characteristics. Additional research would be key to discovering if specific themes and executional characteristics found in the ONDCP, Partnership, and combined ONDCP/PDFA taglines helped explain some of the differences found in the current analyses.

It is clear from the evaluations and publically available materials about both the PDFA and NYADMC campaigns that over time, target audiences, themes, and messages have all shifted. Thus, it is not surprising that middle school youth responded differently than high school youth to different campaigns. However, we cannot tell from the current study what specifically caused

such differences. Further, what is surprising—and concerning—is that combined ONDCP/PDFA tagline advertising which appeared to have desired relationships for most middle school youth over the time period of the study had undesired relationships with some outcomes for high school youth during 2003-2006. Concerns about unintended negative “boomerang effects” have been raised for several campaigns, including anti-drug ads that ran during the 1970s (Feingold and Knapp, 1977). As summarized by Atkin (2002), such unintended effects include inadvertent social normalizing of the unhealthy behavior of drug use and unintentionally promoting drug use by simply portraying it as undesirable. Boomerang effects in response to persuasive advertising also increase when message are perceived to be weak or inconsistent with prior knowledge and/or when the source's credibility is questionable (Czyzewska and Ginsburg, 2007). Johnston argued in Congressional testimony (National Youth Anti-Drug Media Campaign, 2002) that the tagline “Office of National Drug Control Policy” was likely to have adverse connotations with adolescents.

4.1 Limitations

The findings reported here should be viewed within the limitations of the study. As previously noted, the NYADMC incorporated not only TV advertising, but also ads through radio, print, outdoor media, the internet, and other media channels. Our study did not examine potential exposure to all modes of NYADMC advertising, and this omission may affect results. However, previous publications indicate that at least during 1994-2004, 64 percent of ads purchased for the NYADMC involved TV and radio (Hornik et al., 2008). Also, available research indicates that youth viewing of NYADMC online media may have been relatively limited (Blenko et al., 2009). Unfortunately, the current study is unable to evaluate the Above the Influence campaign initiative of the NYADMC due to not having data beyond 2006. Further, the current study also does not examine how potential exposure to anti-drug media campaigns may interact with school-based drug prevention programming. Some studies indicate that analysis of such comprehensive programming may allow for better understanding of campaign effects (Longshore et al., 2006). Another limitation is related to the cross-sectional nature of the MTF survey. However, our use of the MTF cross-sectional data complies with the analytical approach described as appropriate for an evaluation of the NYADMC by the Director of ONDCP (GAO, 2006). Finally, TRP data represent average advertising exposure; individuals may have higher or lower exposure based on personal television viewing behavior.

4.2 Conclusion

It may be unrealistic to expect any mass media campaign to fully prevent substance use among a nation's youth. It is not unrealistic, however, to hope that a well-designed media campaign will delay use onset and/or reduce the prevalence of drug use among some targeted subgroup (s) of youth (Donaldson, 2002). That effect will likely be modest; meta-analysis of media campaigns designed to change health behaviors ranging from seatbelt use to substance use found that such campaigns contributed to an average nine percent change in behavior (Snyder, 2001). Importantly, such average behavior change rates decreased when attempting to address issues such as prevention (vs. promoting a new behavior).

Perhaps the most important message of the current analysis is that no global statement can be made about the efficacy of using televised anti-drug media campaigns to combat substance use among youth. Putting a concerted effort into increasing anti-drug advertising will likely increase the exposure to and recall of such ads among youth. However, the likelihood that such advertising will result in youth being more likely to avoid using drugs, or to use them at lower rates, seems to depend heavily on the type of advertising utilized and how it relates to different ages and characteristics of targeted youth. What specific themes or executional characteristics relate to such differences remains to be clarified.

Highlights

- Substance use outcomes were significantly related to anti-drug advertising.
- Relationships varied by advertising tagline and marijuana focus.
- Findings differed markedly between middle and high school students.

Acknowledgments

The authors wish to thank Jordan Ross and Ewa Werchola for assistance in coding the anti-drug ads.

Role of Funding Source: Funding for this study was provided by the Robert Wood Johnson Foundation (RWJF) through the Substance Abuse Policy Research Program Grant 62708. Funding for the Monitoring the Future study, from which much of the data are drawn, comes from the National Institute on Drug Abuse (Grant Number 3 R01 DA01411). The sponsors had no further role in study design; in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

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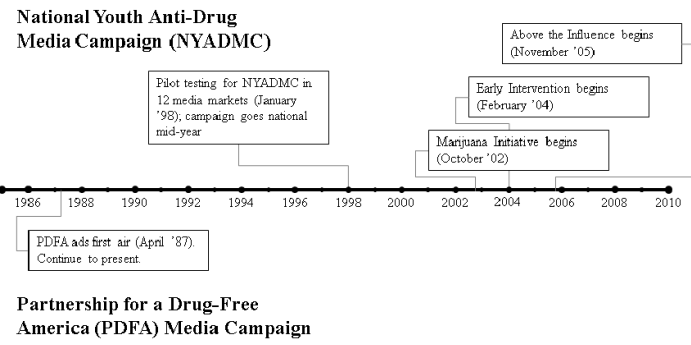


Figure 1. Timeline of National Anti-Drug Advertising Campaigns in the United States, 1987-2006

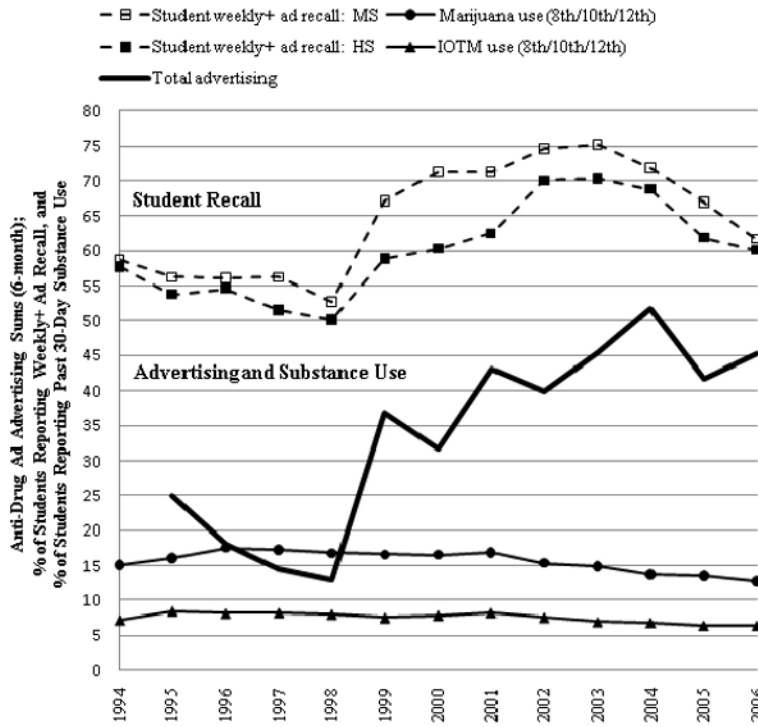


Figure 2. Substance Use, Recall of Anti-Drug Advertising, and Potential Exposure to Anti-Drug Advertising Among US Middle and High School Students, 1994-2006
Notes: All anti-drug advertising measure represents the mean number of times advertising was seen by 100% of youth aged 12-17 in each market area in the six months preceding MTF survey administration. Ad recall refers to self-reported recall of anti-drug ads on TV or radio at least weekly. IOTM refers to use of illicit drugs other than marijuana. MS=middle school. HS=high school.

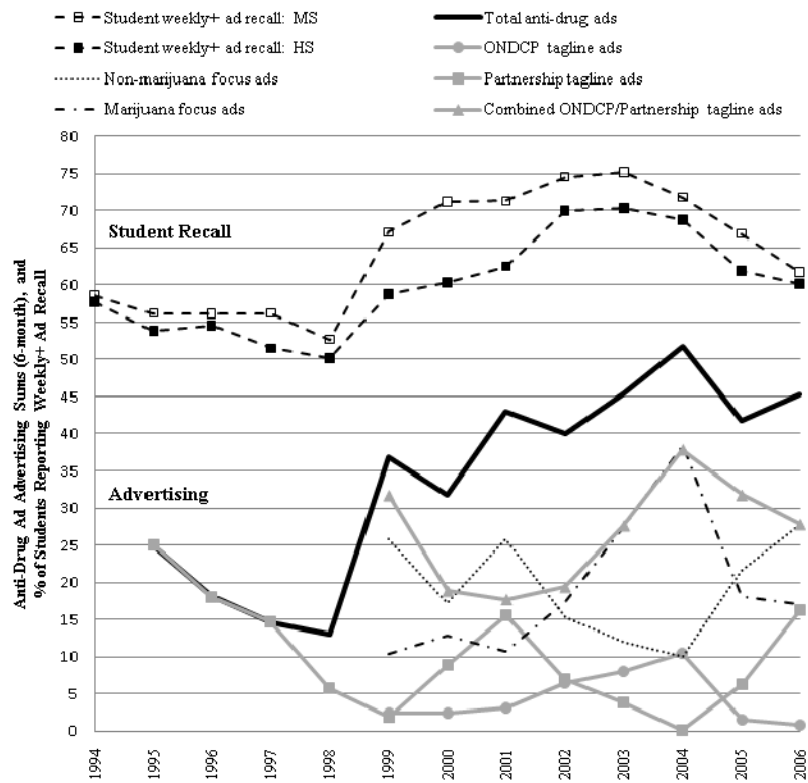


Figure 3. Recall of Anti-Drug Advertising and Potential Exposure to Various Forms of Anti-Drug Advertising Among US Middle and High School Students, 1994-2006

Notes: All anti-drug advertising measure represents the mean number of times advertising was seen by 100% of youth aged 12-17 in each market area in the six months preceding MTF survey administration. Ad recall refers to self-reported recall of anti-drug ads on TV or radio at least weekly. MS=middle school. HS=high school.

Table 1
Sample Descriptives

	Mean or %	SE	Range
<u>Outcomes</u>			
Any past 30-day marijuana use (N=332,586)	15.5	0.179	0,1
Any past 30-day IOTM ^a use (N=327,925)	7.5	0.095	0,1
Any disapproval of using marijuana regularly (N=291,524)	84.3	0.157	0,1
Perceive great risk in using marijuana regularly (N=318,616)	67.3	0.238	0,1
Perceived ability to obtain marijuana fairly easy/easy (N=278,933)	72.3	0.379	0,1
Recall anti-drug ads on TV or radio at least weekly (N=141,544)	63.7	0.276	0,1
<u>Anti-Drug Ad Exposure^b</u>			
Total anti-drug advertising (1995-2006; N=337,918)	33.9	0.311	0.6-89.4
ONDCP tag-line advertising (1999-2006; N=309,190)	3.3	0.076	0.0-17.9
Partnership tag-line advertising (1995-2006; N=337,918)	9.9	0.175	0.0-67.7
Both ONDCP/Partnership tag-line advertising (1999-2006; N=309,190)	19.7	0.289	0.0-49.6
Non-marijuana-focused advertising (1999-2006; N=227,836)	19.2	0.186	4.8-50.2
Marijuana-focused advertising (1999-2006; N=227,836)	19.4	0.233	4.4-49.0
<u>Control variables (N=337,918)</u>			
Male	47.5	0.194	0,1
Grade			
8th	35.7	0.933	0,1
10th	33.7	0.951	0,1
12th	30.6	0.908	0,1
Race/ethnicity			
African American	11.4	0.353	0,1
Hispanic	10.6	0.328	0,1
Other	13.4	0.237	0,1
White	64.6	0.546	0,1
GPA ^c	6.2	0.013	1-9
Likely graduate from college	87.0	0.187	0,1
At least one parent has college degree	72.3	0.311	0,1
Any truancy (past 4 weeks)	19.4	0.250	0,1
3+ nights out per week for recreation	43.9	0.213	0,1
Earned and other income ^d	28.5	0.251	0.0-166.3
Region			
Midwest	25.3	0.860	0,1
Northeast	21.9	0.773	0,1
South	32.5	0.943	0,1
West	20.2	0.804	0,1

Notes: Weighted Ns provided in parentheses. Final sample defined as cases with valid data on total advertising, at least one outcome, and all noted control measures.

^a IOTM = illicit drugs other than marijuana. For 12th graders, this includes LSD, other hallucinogens, crack, other cocaine, heroin and/or any use of other narcotics, amphetamines, sedatives, or tranquilizers not taken under a doctor's orders. For 8th and 10th graders, the use of other narcotics and sedatives has been excluded.

^b All anti-drug advertising measures represent mean number of times advertising was seen by 100% of youth aged 12-17 in each market area in the six months preceding MTF survey administration.

^c Grade point average measured using a 9-item scale where a mean of 6.2 indicates a B (1=D or below, 2=C-, 3=C, 4=C+, 5=B-, 6=B, 7=B+, 8=A-, 9=A)

^d Individual earned and other income adjusted for the CPI82-84.

Table 2
Relationships between Total Anti-Drug Advertising and Drug-Related Outcomes among US Middle School Students, 1995-2006

	Anti-drug ad recall weekly or more			Any disapproval of regular marijuana use			Perceive great risk in regular marijuana use			Marijuana fairly/very easy to obtain		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Total advertising ^a	1.11 [†]	1.08-1.14	0.000	1.05 [‡]	1.02-1.09	0.001	1.02 [‡]	1.00-1.04	0.100	0.99 [‡]	0.96-1.01	0.363
By campaign phase:												
1995-1998	1.07	1.02-1.13	0.003									
1999-2002	1.02	0.98-1.06	0.413									
2003-2006	1.03	0.97-1.10	0.320									
Tagline												
ONDCP	1.18	1.02-1.36	0.022	1.00	0.85-1.18	0.975	0.97	0.85-1.10	0.599	0.98	0.84-1.13	0.741
Partnership	1.05	1.01-1.09	0.024	1.02	0.96-1.09	0.444	0.97	0.93-1.01	0.161	0.99	0.94-1.04	0.650
Combined ^b	1.00	0.94-1.06	0.918	1.12	1.02-1.23	0.015	1.08	1.01-1.15	0.028	1.00	0.94-1.07	0.939
Substance focus												
Non-marijuana	0.96	0.91-1.02	0.180	1.02	0.93-1.11	0.721	0.97	0.91-1.03	0.254	1.05	0.99-1.11	0.130
Marijuana	1.07	1.02-1.13	0.009	1.10	1.03-1.17	0.006	1.06	1.00-1.11	0.031	0.98	0.93-1.04	0.560
Marijuana use, past 30 days												
	OR	95% CI	P	OR	95% CI	P						
Total advertising	0.96 [‡]	0.91-1.00	0.049	0.99 [‡]	0.95-1.03	0.588						
Tagline												
ONDCP	1.02	0.81-1.27	0.883	1.00	0.80-1.26	0.981						
Partnership	0.95	0.88-1.03	0.235	0.98	0.91-1.07	0.686						
Combined	0.88	0.78-0.99	0.036	0.97	0.88-1.07	0.506						
Substance focus												
Non-marijuana	0.95	0.84-1.07	0.418	0.96	0.87-1.06	0.444						
Marijuana	0.89	0.81-0.97	0.010	0.97	0.90-1.05	0.430						

Notes: Total advertising measured using a 6-month sum scaled by units of 10. IOTM defined as illicit drugs other than marijuana. Models for total advertising and tagline include data from 1995-2006. Models for substance focus include data from 1999-2006. All models controlled for gender, race/ethnicity, GPA, college plans, parental education, truancy, nights out, income, region, and year.

^aResults from models without any campaign phase interactions.

^b Ad tagline noted both ONDCP and PDFA.

[†] Significant interactions with total advertising and campaign phase found ($p \leq .01$ or stronger). Campaign phase interaction models included total advertising, campaign phase dummies (with 1995-1998 as the referent), interactions with total advertising and campaign phase dummies for 1999-2002 and 2003-2006, and all other controls.

[‡] No significant campaign phase interactions found.

Table 3
Relationships between Total Anti-Drug Advertising and Drug-Related Outcomes among US High School Students, 1995-2006

	Anti-drug ad recall weekly or more			Any disapproval of regular marijuana use			Perceive great risk in regular marijuana use			Marijuana fairly/very easy to obtain		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Total advertising ^a	1.10 [†]	1.07-1.12	0.000	1.02 [†]	1.00-1.04	0.062	1.00 [†]	0.99-1.02	0.589	0.98 [†]	0.96-1.01	0.204
By campaign phase:												
1995-1998				1.09	1.05-1.14	0.000	1.06	1.03-1.09	0.000	0.90	0.86-0.94	0.000
1999-2002				0.99	0.95-1.03	0.557	0.98	0.95-1.02	0.292	0.99	0.94-1.03	0.558
2003-2006				0.97	0.92-1.02	0.221	0.94	0.90-0.98	0.004	1.09	1.02-1.16	0.009
Tagline												
ONDCP	1.29	1.16-1.44	0.000	0.99	0.88-1.12	0.859	0.96	0.85-1.07	0.432	1.04	0.90-1.19	0.604
Partnership	1.03	0.99-1.07	0.123	1.06	1.02-1.11	0.002	1.03	1.00-1.06	0.092	0.93	0.89-0.97	0.001
Combined ^b	1.02	0.97-1.07	0.499	1.01	0.95-1.07	0.793	1.01	0.96-1.06	0.708	1.02	0.96-1.10	0.506
Substance focus												
Non-marijuana	0.99	0.95-1.05	0.809	1.02	0.97-1.07	0.520	0.97	0.93-1.02	0.260	0.99	0.93-1.06	0.867
Marijuana	1.10	1.06-1.15	0.000	0.98	0.94-1.02	0.351	0.98	0.95-1.02	0.405	1.05	0.99-1.10	0.079
				IOTM use, past 30 days								
Total advertising	0.98 [†]	0.96-1.00	0.121	0.96 [‡]	0.94-0.99	0.003						
By campaign phase:												
1995-1998	0.93	0.89-0.97	0.000									
1999-2002	1.00	0.96-1.04	0.969									
2003-2006	1.03	0.97-1.10	0.277									
Tagline												
ONDCP	0.98	0.87-1.12	0.807	0.98	0.86-1.10	0.690						
Partnership	0.94	0.90-0.98	0.002	0.92	0.88-0.97	0.000						
Combined	1.01	0.95-1.07	0.746	1.00	0.94-1.06	0.921						
Substance focus												
Non-marijuana	0.99	0.94-1.04	0.729	0.98	0.93-1.04	0.460						

	Anti-drug ad recall weekly or more			Any disapproval of regular marijuana use			Perceive great risk in regular marijuana use			Marijuana fairly/very easy to obtain		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Marijuana	1.02	0.97-1.06	0.525	1.00	0.95-1.05	0.961						

Notes: Total advertising measured using a 6-month sum scaled by units of 10. IOTM defined as illicit drugs other than marijuana. Models for total advertising and tagline include data from 1995-2006. Models for substance focus include data from 1999-2006. All models controlled for grade, gender, race/ethnicity, GPA, college plans, parental education, truancy, nights out, income, region, and year.

^aResults from models without any campaign phase interactions.

^bAd tagline noted both ONDCP and PDFA.

^cSignificant interactions with total advertising and campaign phase found ($p \leq 0.1$ or stronger). Campaign phase interaction models included total advertising, campaign phase dummies (with 1995-1998 as the referent), interactions with total advertising and campaign phase dummies for 1999-2002 and 2003-2006, and all other controls.

^dNo significant campaign phase interactions found.