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The Effect of Marijuana Scenes in Anti-marijuana Public Service Announcements on Adolescents' Evaluation of Ad Effectiveness

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Abstract

This study explored the possible negative impact of a specific ad feature—marijuana scenes—on adolescents' perception of ad effectiveness. A secondary data analysis was conducted on adolescents' evaluations of 60 anti-marijuana public service announcements (PSAs) that were a part of national and state anti-drug campaigns directed at adolescents. The major finding of the study was that marijuana scenes in anti-marijuana PSAs negatively affected ad liking and thought valence toward the ads among adolescents who are at higher levels of risk for marijuana use. This negative impact was not reversed in the presence of strong anti-marijuana arguments. The results may be used to partially explain the lack of effectiveness of the anti-drug media campaign. It may also help us design more effective anti-marijuana PSAs by isolating adverse elements in the ads that may elicit boomerang effects in the target population. Limitations of the study and future directions were discussed.

Keywords

marijuana scene; anti-marijuana public service announcement; perceived ad effectiveness; adolescent; risk

Marijuana is the most commonly used illicit drug in the United States (ONDCP Fact Sheet, 2004). According to the report based on The Youth Risk Behavior Survey, 22 % of high school students currently use marijuana and one tenth of them had their first trial of marijuana before age 13 (Grunbaum et al., 2004). Marijuana use poses a serious health threat to adolescents as it is related to negative health consequences, including defects in immune system, lung damage, depression, and anxiety (Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001). Moreover, although not necessarily a gateway drug, those who use marijuana may be more likely than others to use cocaine or other hard drugs (Merrill, Kleber, Shwartz, Liu, & Lewis, 1999).

Several nationwide anti-drug media campaigns have been carried out to reduce and prevent drug use among youth. By far the largest anti-drug media effort in history is the National Youth Anti-Drug Media Campaign (NYADMC) initiated by the White House Office for National Drug Control Policy. Through 2003, this campaign cost $1.2 billion (House Report 107–575, 2003). The President's fiscal year 2006 budget proposed an additional $120 million for this media campaign (Walters, 2005, June). Eighty two percent of this budget

was required to be used for advertising time and placement (Walters, 2005, June). Currently, anti-drug public service announcements (PSAs) comprise the centerpiece of these anti-drug media efforts (Varshavski, 2003). Despite the huge amount of money spent on the NYADMC, researchers evaluating the effectiveness of this media campaign have found no evidence that exposure to the anti-marijuana campaign for youth 12 to 18 years old reduced their marijuana use between 2002 and 2003. Instead, there was an increase in the past-month and past- year marijuana use in the target audience of 14 to 16 year olds during this period, although this upward trend appears to have already been in place before the start of the marijuana initiative (Hornik et al., 2003). This finding is not surprising. In fact, a meta-analysis of 72 anti-substance abuse media campaigns has revealed mostly inconclusive results (Derzon & Lipsey, 2002).

Careful attention to these media messages can be critical for understanding the lack of effectiveness of the campaign. Recent behavioral science theory and research have pointed out the importance of message content in the success of behavioral change interventions (Fishbein, Hall-Jamieson, Zimmer, von Haeften, & Nabi, 2002). Prior studies have identified certain content and format features in anti-drug PSAs that appear to be conducive to positive or negative effects. For example, PSAs emphasizing social implications are more effective than those focusing on physical harms of drug usage (Shoenbachler & Whittle, 1996). Anti-marijuana ads targeting the belief that marijuana is a gateway to stronger drugs were counterproductive, actually increasing positive attitudes and intentions toward marijuana use (Yzer, Cappella, Fishbein, Hornik, & Ahern, 2003). Ads that use deliberate fear appeals may be risky as they may elicit psychological reactance from the viewers, which can reduce an ad's effectiveness (Shoenbachler & Whittle, 1996). In fact, it has been suggested that by alarming the audience through portraying the proscribed behaviors, the PSAs may serve to normalize the unhealthy behavior, and promote competition and imitation from the audience (Wagner & Sundar, 1999) as audience "becomes curious, learns it is fun, or regards it as challenging" (Atkin, 2001, p.31). This is especially the case for high-risk adolescents (Atkin, 2001).

In addition to the content components, the executional styles of the messages also contribute to varied levels of ad effectiveness. For example, anti-drug ads with high sensation value (i.e., ads that can elicit higher levels of sensory, affective and arousing reactions from the target audience) are found to attract more attention and increase message processing in high-sensation seeking adolescents (Donohew, Lorch, & Palmgreen, 1991, Lorch et al., 1994). Controlled community trials also show that anti-drug PSAs embedded in high sensation value TV programs are able to reverse upward trends in 30-day marijuana use among high-sensation seeking adolescents (Palmgreen et al., 2001). High message sensation value of the antidrug PSAs may also attract more attention to the executional features and hence interfere with one's processing of the antidrug argument of the ad (Kang, Cappella, & Fishbein, 2006).

Compared to the number of studies on the effectiveness of antismoking messages on audience reactions (e.g., Beaudoin, 2002; Biener, 2000, 2002; Farrelly et al., 2002; Goldman & Glantz, 1998; Pechmann & Reibling, 2000; Pechmann, Zhao, Goldberg, & Reibling, 2003; Shadel, Niaura, & Abrams, 2002), studies on anti-drug and specifically anti-marijuana

messages are limited (Harrington et al., 2003; Palmgreen et al., 2001). This may partly reflect the difficulty of finding significant impacts of these anti-marijuana messages, which further calls for innovative ways to explore message features that may affect ad effectiveness. The current study responds to this need and explores one ad feature that may negatively affect an ad's effectiveness, given sufficient exposure. A secondary data analysis is conducted to test the hypothesized effects of this ad feature. The results may help our understanding of the conditions under which anti-drug ads are ineffective. It may also help us to design more effective anti-marijuana PSAs, by isolating adverse elements in the ads and reducing the likelihood that certain PSAs may elicit boomerang effects in the target population (Fishbein et al., 2002).

Marijuana Scenes in Anti-marijuana PSAs

The ad feature examined in this study is the presence of marijuana scenes. They are defined as any visual scene that portrays (a) mere presence of marijuana-related materials (e.g., marijuana cigarette); (b) holding and handling of marijuana cigarettes (e.g., preparing the cigarette for smoking, holding, ignition), or (c) actual marijuana smoking behavior (e.g., puffing, inhaling). Similar drug use cues in the context of tobacco and other hard drugs have been used in cue-reactivity studies (Juliano & Brandon, 1998; Sayette & Hufford, 1994). However, to our knowledge, no study has specifically linked the marijuana scenes in anti-marijuana PSAs to adolescents' perception of ad effectiveness.

This study explores the role of marijuana scenes in anti-marijuana PSAs. It addresses a series of questions: (a) Do marijuana scenes negatively affect adolescents' ad effectiveness evaluation? (b) If so, do strong anti-marijuana arguments help to offset this negative impact? (c) If marijuana scenes indeed negatively affect ad effectiveness evaluation, on which population is the impact more evident? If there is evidence for the negative effects of marijuana scenes on message effectiveness, then the use of marijuana scenes may produce second thoughts when considering ad design. Even if anti-marijuana arguments overcome any negative impact of marijuana scenes, the net effect may still be counterproductive. Thus it is important to understand the impact of marijuana scenes in anti- marijuana PSAs to exploit their values or to avoid possible boomerang effect. Considering the huge amount of money spent on the war on drugs, understanding which anti-drug messages are most effective and which message features contribute to success and failure in the target population is a requirement.

Two theoretical perspectives suggest that marijuana scenes may negatively affect message effectiveness. First, according to social cognitive theory (Bandura, 1986), people learn from observing others' behaviors. Television and other mass media can serve as presentational or educational tools through which people can learn vicariously. Social cognitive theory posits that one's modeling behavior is influenced by one's judgment of personal ability to accomplish the modeled behavior, perception of the nature and the consequences of the modeled behavior, and the likelihood that the same consequences would occur if one performs the same behavior. However, the nature and consequence of the modeled behavior is "largely determined by its relation to other outcomes rather than inherent in their intrinsic qualities" (Bandura, 2002, p. 132). In anti-marijuana PSAs, the presence of marijuana scenes

often implies that marijuana is easy to get (e.g., drug dealers are just around the corner), it is not hard to use (e.g., kids similar to you use it), it is widely used or accepted among adolescents (e.g., a group of kids are passing around the marijuana cigarette), and the users may even look cool (e.g., adolescents users are often presented as rebellious with cool attires and postures). Although these scenes often lead to an anti-marijuana argument either through voiceover or screen verbals or the languages and behaviors of the actors or actresses, the presence of marijuana scenes nevertheless serve as a direct illustration of marijuana use and, according to social cognitive theory, affect adolescents' perception of the behavior. To adolescents who are curious to learn new things and to be accepted by their peers, these scenes may arouse curiosity, teach or illustrate details related to marijuana use, create an illusion that everyone else is using marijuana, and even normalize the proscribed behavior and promote competition and modeling from nonusers (Wagner & Sundar, 1999; Atkin, 2001).

Second, the theory of attentional bias suggests that individuals tend to be attracted and pay more attention to stimuli related to their current concerns or pathologies (Waters & Feyerabend, 2000). For example, people are more alert and attentive to their names. In experimental settings, a performance degradation (usually indicated by a slower response to a task) during exposure to relevant stimuli is used as evidence of attentional bias to those stimuli. Theoretically, these stimuli are perceived by the target population as having some kind of "incentive salience" which indicates the relevance of the stimuli for reinforcement and hence demands the organism's attention (Robinson & Berridge, 1993). Attentional bias can interfere with one's performance on other cognitive tasks, indexed through increased reaction time to audio probes or reduced comprehension accuracy for a subsequent sentence-processing task (e.g., Cepeda-Benito & Tiffany, 1996; Juliano & Brandon, 1998; Madden & Zwaan, 2001; Sayette & Hufford, 1994; Zwaan & Truitt, 1998). For adolescents who are interested in using marijuana, who have tried it a few times, or who are even addicted to marijuana use, presence of marijuana scenes may elicit an attentional bias, which in turn may interfere with their ability to process the anti-marijuana arguments embedded in the message, leading to lowered levels of perceived ad effectiveness.

Marijuana scenes, as elicitors of attentional bias, may work as cognitive distracters reducing the processing of anti-marijuana arguments or as social cues operating as counterarguments to the anti-drug arguments in the ad. In both cases, marijuana scenes would reduce the ad effectiveness evaluation. Thus, it is hypothesized that,

> H1: Ads with marijuana scenes will lead to lower ad effectiveness evaluation than ads without marijuana scenes.

Social cognitive theory also suggests that the modeling behavior will be minimized when the negative consequences of the behavior are clearly presented. Since anti-marijuana PSAs also contain anti-marijuana arguments, which often illustrate the negative consequences of marijuana use, the imitation or modeling effects resulted from marijuana scenes, if any, should be minimal from a social learning perspective. Thus the anti-marijuana arguments in the ads may serve as a protection against the possible negative effects of marijuana scenes. Stronger arguments should be more effective than weaker arguments in this respect as they often illustrate the negative consequences of marijuana use more effectively (e.g., either

through more persuasive languages or through more relevant examples). This would make ads with marijuana scenes and stronger arguments appear more effective than ads with marijuana scenes and weaker arguments. Thus it is hypothesized that:

> H2: Stronger anti-marijuana arguments can overcome the negative impact of marijuana scenes on ad effectiveness evaluation to a larger extent than weaker arguments.

For H1, an additional individual difference factor may make the effect more evident. This factor is the risk status of the adolescent audience. The risk of marijuana use is defined as a risk index for adolescents' possible marijuana use. Since adolescents often do not truthfully report their marijuana use behavior, this measure is designed to predict their risk of marijuana usage based on predictors that have been found to relate to adolescents' marijuana use behavior obtained in the previous national surveys. These predictors of marijuana use include age, sensation seeking tendency, and immediate social network, including the number of friends who use marijuana and the number of times marijuana is offered (Yzer et al., 2004).

There are several reasons that high-risk adolescents will be more affected by marijuana scenes than low-risk adolescents. First, adolescents with a higher risk of marijuana use are more interested in marijuana use, are more likely to be past users and tend to hold a more positive attitude toward marijuana use (Yzer et al., 2004). Hence marijuana scenes are more salient to high-risk adolescents and more likely to elicit attentional bias among them. Second, this group of adolescents also tends to be high sensation seekers. According to the Activation Model of Information Exposure (Donohew, Lorch, & Palmgreen, 1998; Zuckerman, 1979), high sensation seekers are more attracted to messages with high sensation values. Ads with marijuana scenes are more sensational than those without such scenes, especially when such scenes portray a proscribed behavior. Thus high-risk adolescents are more likely to be distracted by the marijuana scenes and hence less likely to fully process the anti-marijuana arguments embedded in the ads. Third, high-risk adolescents have more marijuana encounters (e.g., more friends using marijuana, more opportunity to be offered marijuana, Yzer et al., 2004). For them, marijuana scenes may serve as an illustration for marijuana use details (e.g., how to use it and where to get it), or a reminder of their past experience, or a justification of the behavior, and hence promote more competition and modeling behavior from this segment of the population. Hence we expect to see that:

> H3: The negative impact of marijuana scenes on ad effectiveness evaluation is larger among high-risk adolescents than among low-risk adolescents.

It is important to recognize that evaluation of ad effectiveness may or may not relate to the actual ad effect, i.e., change in drug use behaviors. However, judgment of ad effectiveness is often a necessary (although not sufficient) condition for producing actual change in beliefs, attitudes and behavioral intentions that are important determinants of drug use behaviors (Fishbein et al., 2002). Moreover, prior studies have shown that perceived ad effectiveness provides important information about audience attitudes and can be a good proxy measure of actual effectiveness (Biener, 2002; Biener & Taylor, 2002).

Methods

A secondary data analysis was conducted on adolescents' evaluations of 60 anti-marijuana and general anti-drug PSAs that were part of national and state anti-drug campaigns directed at adolescents. Three sources of data were employed in this study. The first source provided data on ad effectiveness evaluations. The second source provided information on the strength of the arguments used in the ads. The third source supplied the coding of marijuana scenes. Details about the measures used in each study and each study's sample characteristics are described below. It is important to recognize that the evaluations of argument strength are provided by a sample of adolescent respondents different from the sample that rated the ad effectiveness. Unlike some ad evaluation studies, this study poses and answers its questions at the ad level, in which multiple adolescents' ad evaluations of the same ad were averaged into a single score. So the new data set contained aggregated ad and argument evaluations, as well as marijuana scene coding for each of the ads (N =60). In the original studies, individual adolescents' risk of marijuana use was also calculated. Each individual was put into a high or low risk category based on the median split on this measure. The aggregate ratings for each ad were also calculated separately for high- and low-risk adolescents. Thus the final data contained aggregate-level ratings for each ad among all adolescents as a whole as well as among high- and low-risk adolescents respectively.

Samples

Ad effectiveness evaluation—601 youths aged 12–18 (M = 15.3) participated in this research in exchange for $10 in cash as compensation for their time. The sample included approximately equal numbers of males (301) and females (300), and was predominantly Caucasian (71.9% Caucasians, 23.6% African Americans, and 4.5% other race/ethnicity). Participants were recruited from shopping malls in urban locations throughout the US, including San Diego, Atlanta, Detroit, and New York, by Opinion One, a market research firm. Signed parental consent and youth assent forms were obtained prior to participation.

Argument strength evaluation—The sample included 322 adolescents, 49.7% of whom were male. About two thirds (66.8%) of the sample were Caucasians, 22.4% African Americans, and 10.8% from other ethnic or racial groups. Age ranged from 12 to 18, with a mean of 15.4 (SD = 1.95). Respondents were recruited through mall intercept solicitations at 15 locations across the country, including Oakland, St. Louis, Cincinnati, San Antonio, Charlotte, Washington DC, and Kansas City. Signed parental consent and youth assent forms were obtained prior to participation. Respondents were paid $5 each for their participation.

Measures

Trained coders coded marijuana scenes in the ads. Ads with any of the three types of marijuana scenes (mere presence, holding and handling, and actual smoking of marijuana cigarettes) were coded as 1 and ads without such scenes were coded as 0 (Krippendorff's alpha = 1.00). The resulting "marijuana scene" variable had two categories: "ads with marijuana scenes" (N=24) and "ads without marijuana scenes" (N=36).

Argument strength is conceptualized as the strength of the argument presented in the PSA. One comprehensive argument per ad was extracted by experts using both the verbal claims and visual arguments presented by the ads. Adolescents evaluated the extent to which each argument was convincing, strong, believable, important, made them feel confident to say no to marijuana, kept them away from using marijuana, elicited agreement from them and put thoughts in their mind about staying away from marijuana. Each of these judgments was measured on a 5-point scale (0=strongly disagree, 5=strongly agree). The mean of these items were used to indicate argument strength (M = 3.70, SD = .15, Cronbach's α =.90). A description of the argument evaluation process and the scale reliability and validity is presented in Zhao, Cappella, Fishbein, & Barrett (2005). This measure was dichotomized at median in the analyses. The two argument strength conditions (M_{low}= 3.58, SD_{low} =.10 vs. M_{high}= 3.82, SD_{high} = .09) were significantly different from each other, F (1, 59) =100.34, $p < .001$.

Three measures of ad effectiveness were used: perceived ad effectiveness, ad liking and the predominant valence of thoughts generated by the ad. These measures are originated from different research traditions and are conceptually distinct from each other. Perceived message effectiveness is developed in the area of argument studies to directly measure one's perception and evaluation of the convincingness of the message. Ad liking is common in advertising literature to measure one's overall attitude toward the ad. An overall positive attitude toward the ad is used as an important antecedent to ad effectiveness, together with positive attitude toward the brand and purchase intention. Thought listing is widely used in attitude change literature. It looks at the predominant valence of the thoughts generated by the message to indirectly assess message effectiveness (Haugtvedt & Priester, 1997). It is often considered as a gold standard to assess message strength. The separation of these three measures helps illustrate the robustness of the patterns observed from two message features and facilitates our interpretation of ad effects.

Perceived ad effectiveness was measured with four items on a 5-point scale (1=strongly disagree, 5=strongly agree): "This ad was convincing", "The ad said something important to me", "Watching this ad helped me feel confident about how to best deal with using marijuana", and "If my friends were offered marijuana, this ad would help keep them from using marijuana" [1]. The mean of the four items was used to indicate the perceived anti-marijuana effectiveness of the ad (M = 3.36, SD = .23, Cronbach's α = .79). A similar scale used in a previous study successfully distinguished between ads with different message features and targeting different types of drugs (Fishbein et al., 2002). Ad liking was measured with a single 7-point item (1= not at all, 7= very much): "Do you like the ad" (M = 4.88, SD = .45). Thoughts about each ad were generated following the conventional thought listing procedure (Petty & Cacioppo, 1986). Adolescents were asked to report as many as

[1]Although argument strength and perceived message effectiveness adopted similar items in their measurement scales, they represented distinct concepts and were evaluated differently. First, argument strength was an assessment of the argument component of the ads while perceived message effectiveness was an assessment for the ads as a whole, including verbal, audio and visual components. Second, different samples evaluated argument strength and perceived message effectiveness. Arguments were rated as pure verbal sentences extracted from the ads, while ads were evaluated in an audiovisual format. Third, perceived ad effectiveness was a holistic evaluation of the ads and hence was influenced by not only the arguments, but also other message features, including marijuana cues and MSV, etc. Thus no significant correlation was found between argument strength and perceived message effectiveness (r = .17, p = ns).

four thoughts per ad after viewing it. Positive and negative thoughts were coded (kappa > = .80). The number of negative thoughts (*M* = 14.9, *SD* = 7.6) was subtracted from the number of positive thoughts (*M* = 39.1, *SD* =7.7) to get a score of the dominant thought valence for each ad (*M* = 24.0, *SD* = 13.8). An ad that elicited predominantly positive thoughts was considered to be of a higher quality or effectiveness, following the conventional interpretation of thought listing procedure (Petty & Cacioppo, 1986). The inter-correlations among the three indicators of ad effectiveness evaluation were .71 between perceived ad effectiveness and thought valence, .78 between perceived ad effectiveness and ad liking, and .82 between ad liking and thought valence. Because of the conceptual distinctiveness and need for interpretation mentioned above, we kept them as separate indicators.

Risk of marijuana use in the previous year was assessed in the original studies for both the sample which provided the argument evaluation data and the sample that supplied the ad evaluation measures. It is a behavioral measure developed from a previous independent survey on adolescent marijuana use (*N* = 600). Based on parameters developed in that survey, risk of marijuana use was calculated as risk = −9.34 + .19 x (age) + .62 x (the number of friends who used marijuana) + .66 x (the number of times marijuana was offered) + .11 x (sensation seeking) (Yzer et al., 2004). The adolescents in the original sample were put into either a higher and lower risk group based on median-split of this measure. It is important to note that the parameters for the risk measure were calculated in the original studies. The current secondary analysis only had access to the aggregated data for the high and low risk adolescents. Hence the statistics for this risk measure were not available in this analysis.

To rule out possible confounders for the impact of marijuana scenes and argument strength, we controlled two sets of message features in the study. One was a message format variable —message sensation value (MSV). It is a set of message features designed to elicit sensory, affective and arousal responses (Everett & Palmgreen, 1995; Palmgreen et al., 1991). These structural features, including formal video, audio and content features (Morgan, Palmgreen, Stephenson, Hoyle, & Lorch, 2003), are found to be able to distract attention away from processing of the central argument (Kang et al., 2006). Hence MSV is controlled to make sure that the distraction effect, if any, is due to marijuana scenes rather than MSV. MSV features were coded using the coding scheme developed by Morgan et al. (2003). The MSV total score was calculated as the sum of all individual MSV features (*M* = 5.63, *SD* = 2.55, kappa > .79).

The second set of message features is argument content. Argument content concerns the different outcomes of marijuana use mentioned in the ad. Four types of argument content related to the consequences of marijuana use (1= not at all about a certain belief, 5= strongly about that belief), including health costs (*M* = 1.40, *SD* = 1.08), social costs (*M* = .84, *SD* = .89), self-esteem costs (*M* = 1.63, *SD* = .79), and positive outcomes of using marijuana (*M* = .24, *SD* = .35), were coded. The intercoder reliability was acceptable (kappa > .79), assessed following the procedure suggested by Rosenthal (1987). The detailed information about the coding of these variables can be found in the original study by Yzer et al. (2003). Because it is possible that ads with strong arguments mentioned more health consequences of

marijuana use, controlling argument content allows us to separate the impact of argument strength from that of argument content.

Results

Marijuana scene (with two categories: presence versus absence) was not correlated with argument strength (r =− .05, p = .71), suggesting that two factors were not confounded. The correlations between marijuana scene and two sets of possible confounding variables (MSV and argument content) revealed one significant relationship. Ads with marijuana scenes were more likely than their counterparts to mention positive outcomes of marijuana use, r = .33, p = .01. All the following analyses were conducted with ANCOVA with MSV and argument content as covariates. Table 1 presents the means and standard deviations of three dependent measures of ad effectiveness evaluation by ad and participant condition.

Marijuana Scene and Argument Strength on Ad Effectiveness Evaluation

There was a marginally significant main effect of marijuana scene on ad liking, F (1, 51) = 3.69, p = .06, partial η^2 = .07. Ads with marijuana scenes were liked less (M = 4.73, SD = .50) than ads without such scenes (M = 4.98, SD = .39). Similar but non-significant patterns were found on dominant thought valence and perceived ad effectiveness. H1 received partial support. There was no main effect of argument strength or interaction between marijuana scene and argument strength on any ad effectiveness evaluation measure. H2 was not supported.

Post-Hoc analyses indicated that the negative effect of marijuana scenes was purely driven by the category of actual marijuana smoking scenes. After controlling for MSV and argument content, the contrast between ads with actual marijuana smoking scene (N =15) and ads without marijuana scene (N =36) produced significant main effect on all three ad evaluation measures. Specifically, adolescents perceived ads with actual smoking scenes as less effective (M = 3.19, SD = .23) than ads without marijuana scenes (M = 3.40, SD = .23), F (1, 42) = 6.15, p< .02. They did not like the ads with actual smoking scenes (M = 4.55, SD = .48) as much as the ads without such scenes (M = 5.00, SD = .39), F (1, 42) = 8.65, p= .005. They also had fewer net positive thoughts about ads with actual marijuana smoking scenes (M = 18.28, SD =16.27) than about ads without marijuana scenes (M = 27.10, SD = 12.03), F (1, 42) = 7.72, p= .008. In contrast, the comparison between ads with presence, holding and handling of marijuana cigarettes (N = 9) and ads without marijuana scenes showed no significant effect on any ad evaluation measure.

High-risk versus Low-risk Adolescents

Risk of marijuana use (dichotomized) exhibited a significant main effect on all three ad evaluation measures. The low-risk adolescents perceived the ads to be more effective (M = 3.58, SD = .25) than the high-risk adolescents (M = 3.17, SD = .27), F (1, 107) = 66.98, p < .001, partial η^2 = .39. They also liked the ads more ($M_{lo\text{-}risk}$ = 5.14, $SD_{lo\text{-}risk}$ = .45 vs. $M_{hi\text{-}risk}$ = 4.50, $SD_{hi\text{-}risk}$ = .59, F (1, 107) = 44.42, p < .001, η^2 = .29), and gave more net positive thoughts to the ads ($M_{lo\text{-}risk}$ = 15.72, $SD_{lo\text{-}risk}$ = 7.19 vs. $M_{hi\text{-}risk}$ = 8.28, $SD_{hi\text{-}risk}$

= 9.09, F (1, 107) = 32.50, $p < .001$, $\eta^2 = .23$) than their high-risk counterpart, regardless of marijuana scenes and argument strength.

The interaction between risk and marijuana scene was significant on thought valence (F (1, 107) = 4.40, $p < .05$, partial $\eta^2 = .04$), marginally so on ad liking (F (1, 107) = 3.03, $p < .09$, partial $\eta^2 = .03$) and not significant on perceived ad effectiveness. The high-risk adolescents had significantly more net positive thoughts about the no-marijuana-scene ads ($M = 10.70$, $SD = 8.33$) than the marijuana-scene ads ($M = 3.67$, $SD = 9.46$), F (1, 51) = 7.69, $p = .008$, partial $\eta^2 = .13$. The high-risk adolescents also liked the ads without marijuana scenes ($M = 4.74$, $SD = .55$) more than ads with such scenes ($M = 4.26$, $SD = .58$), F (1, 51) = 8.99, $p < .005$, partial $\eta^2 = .15$. However, marijuana scenes did not affect any ad evaluation measure among the low-risk group. Figures 1 and 2 present the interaction between risk and marijuana scenes on thought valence and ad liking respectively. H3 was partially supported. For this analysis, ads with actual marijuana smoking scenes and ads with presence, holding and handling of marijuana cigarette scenes revealed similar patterns of effects both among low-risk and among high-risk adolescents. Thus the impacts of marijuana scenes on ad effectiveness evaluation were more driven by the risk level of adolescents than the type of marijuana scenes.

Risk also interacted with argument strength on thought valence, F (1, 107) = 4.67, $p < .04$, partial $\eta^2 = .04$. For high-risk adolescents, stronger arguments received fewer net positive thoughts ($M = 4.58$, $SD = 8.87$) than weaker arguments ($M = 9.79$, $SD = 9.29$), F (1, 51) = 4.04, $p = .05$, partial $\eta^2 = .07$. For low-risk adolescents, no significant effect of argument strength was found on thoughts valence. Figure 3 presents this interaction. No other significant effects were found on the other two ad evaluation measures.

In sum, the negative effect of marijuana scenes was only revealed for the high-risk group. The high-risk group responded more favorably to ads with no marijuana scenes and ads with weaker than stronger arguments. For the low-risk group, marijuana scene or argument strength did not affect their ad evaluations. They seem to evaluate the ads with or without marijuana scenes, with stronger or weaker arguments, as equally effective or ineffective. Their overall evaluation of ad effectiveness was also more positive than that from the high-risk adolescents.

Discussions

The major finding of the study is that marijuana scenes in anti-marijuana PSAs can negatively affect high-risk adolescents' liking toward the ads and their thought valence during ad viewing. Although the current study does not have a control group, and hence can not show whether there is a boomerang effect associated with marijuana scenes, the study nevertheless suggests ads with this message feature as significantly less effective than others. This negative impact of marijuana scenes is not reversed in the presence of strong anti-marijuana arguments in the ads and is mainly present for the group of adolescents (i.e., high-risk adolescents) who are often the targets of such anti-marijuana ads. For these adolescents, stronger anti-marijuana arguments have in fact produced more negative thoughts about the ads than weaker arguments. This may be a result of psychological

reactance or defensive processing. Since these high-risk adolescents have more positive attitude toward marijuana use as found both in previous studies (e.g., Yzer et al., 2004) and in the current analysis (i.e., high-risk adolescents generally rated the anti-marijuana ads as less effective than low-risk adolescents), they are more likely than the low-risk adolescents to be psychologically reactant to the anti-marijuana messages. When facing stronger rather than weaker anti-marijuana arguments, their personal beliefs and values about marijuana are more challenged and they are hence more likely to activate defensive processing of the ads in the presence of stronger arguments.

Possible Mechanism for the Negative Impact of Marijuana Scenes

The negative impact of marijuana scenes is found to be stronger for ads with actual marijuana smoking scenes than ads with other types of marijuana scenes among the whole sample. However, this effect may result from the smaller number of ads that contain mere presence, holding and handling of marijuana cigarettes (*N*=9). The difference between various types of marijuana scenes disappeared after taking into account adolescents' risk level. This suggests that adolescents' risk of marijuana use more than the type of marijuana scenes explain the negative impacts of marijuana scenes on ad effectiveness evaluation.

To find out why marijuana scenes negatively affect ad liking and thought valence, we further explored the emotional impacts of these ads. In the original studies, adolescents also rated all 60 ads with regard to how the ads made them feel emotionally. Four emotions were assessed, including fear (M = 1.60, SD = .23), sadness (M = 1.72, SD = .33), inspiring (M = 2.30, SD = .24), and sympathy (M = 1.89, SD = .28), on a 4-point scale (0=not at all, 4=very much). An aggregate score on each emotion was obtained by averaging across the adolescents who viewed the same ad (the same procedure used with ad evaluation data). Presence of marijuana scenes was negatively correlated with "feeling inspired" for both high-risk (r = −.41, p< .001) and low-risk adolescents (r = −.31, p= .02) [2]. "Feeling inspired" was positively correlated with all three ad evaluation measures for both high-risk (r ranged from .67 to .79, p < .003) and low-risk adolescents (r ranged from .39 to .52, p < .003). The more one feels inspired after viewing the ads, the more one considers the ad as effective or vice versa. When inspire was controlled in the path analyses, the negative impact of marijuana scenes on ad effectiveness evaluation found among the high-risk group disappeared. Only the effect of argument strength on thought valence remained the same (F (1, 59) = 3.95, p= .05, partial η^2 = .07) after controlling for inspire. Moreover, the impact of marijuana scenes on inspire did not change when ad effectiveness measures were controlled in the analysis. This suggests that "feeling inspired" fully mediated the impact of marijuana scenes on ad effectiveness evaluation. The presence of marijuana scenes reduced one's feeling of inspiration, which in turn reduced their evaluation of ad effectiveness. Because emotional reactions and ad effectiveness evaluations were collected at the same time, the causal direction is only empirically explored than confirmed.

[2]For the high-risk adolescents, feeling inspired was the only emotion that was significantly correlated with marijuana scenes. For the low-risk adolescents, feeling afraid was the only other emotion that was significantly related to marijuana scene, r = .26, p < .05.

Implications for Anti-Marijuana PSAs

Based on the current findings, the presence of marijuana scenes appears to undermine ad liking and thought valence when the target audience is at a higher risk of marijuana use. The high-risk group is often the primary target of anti-marijuana PSAs with message strategies specially designed for this group of people (e.g., Palmgreen et al., 2001). For this segment of adolescents, including marijuana scenes in anti-marijuana PSAs may not be a good strategy. When the risk level of adolescents is uncertain or not considered, the current study suggests that the actual marijuana smoking scenes may be more troublesome in comparison to other types of marijuana scenes. The actual marijuana-smoking scenes are most explicit as they directly illustrate the active marijuana using behavior. Their impacts on modeling behaviors and attentional bias should be stronger compared to marijuana scenes that only present the possibility of marijuana use (in the case of mere presence of marijuana cigarettes), or that only suggest an incident of marijuana use (in the case of holding and handling of marijuana cigarettes). However, readers should be cautioned that the results on the different impacts of different types of marijuana scenes are not conclusive and they may be simply a result of the small number of ads in the latter categories.

The current study also suggests that the ads that make one inspired are perceived as effective, especially among the high-risk adolescents. However, the presence of marijuana scenes reduces this feeling. It is possible that the marijuana scenes used in a specific context may have reignited these high-risk adolescents' positive attitude about marijuana use or reduced their admiration for the character(s) in the ads, which ultimately reduces the instructive value of the ads and hence ad effectiveness. Although the specific mechanism still awaits future test, this result may underline the importance of using certain positive emotional appeals in PSA design. The positive effect of inspire is similar to that of some other positive emotions, such as hope and pride. A prior study on cigarette smoking has reported that the emotions of hope and pride both contribute to one's intention to quit smoking (Cappella, Romantan, Lerman, & Patterson, 2006).

Limitation and Future Direction

The study was conducted with a limited set of ads ($N = 60$). The adolescent participants producing these effects cannot be considered a random or a representative sample. The current study is concerned only with anti-marijuana PSAs directed at adolescents. All of these factors will limit the generalizability of the findings. Nevertheless the number of ads per condition classified by argument strength and marijuana scenes was at least 24 and the mean estimates used in the analyses came from a diverse group of adolescents in terms of age, race, gender, residence, and socio-economic status (as indicated by mother's education).

The study does not test the actual effects of ads on behavioral intention or behaviors. Instead judgments of ad effectiveness are employed as surrogate measures of more direct consequences. The surrogates we employed allow us to evaluate many ads simultaneously but run the risk that the ad evaluation judgments employed are only weak predictors of behavioral intention or actual behavior change. We have used three evaluation measures to help reduce this risk. The fact that thought valence has exhibited most significant findings,

followed by ad liking and last by perceived ad effectiveness may be a direct reflection of the varied levels of range restrictions of each measure ($SD_{\text{thought valence}}$ = 13.79, $SD_{\text{ad liking}}$ =. 45, $SD_{\text{perceived effectiveness}}$ =.23). Because these three measures are all indicators of ad effectiveness evaluation, the results suggest that given sufficient variance, the impact of marijuana scenes may be observable on all three ad evaluation measures.

The lack of strong effect from argument strength in the current study may reflect the fact that most anti-marijuana arguments are not strong compared to those directed at hard drugs (e.g., methamphetamine or heroin, Fishbein et al., 2002). What makes this issue more prominent is that the current data are aggregate level data. Averaging across multiple individuals' argument evaluations has further limited the variance of this measure. In the present study, argument strength has a moderate mean and a very small range (M = 3.70, SD = .15 on a 5-point scale). The difference between strong and weak arguments (i.e., .24 on a on a 5-point scale) is rather small in magnitude and both levels of arguments may be considered as representing a moderate level of argument strength. In the context of much stronger arguments than are available with marijuana or with this set of ads, the effect of argument strength on ad evaluation may be stronger.

As a secondary data analysis, the study only hypothesizes the underlying causal mechanisms of the negative impacts of marijuana scenes on high-risk adolescents' ad evaluations. Feeling inspired is found to be able to account for this negative impact. However, other alternative explanations not explored in this study may also hold (e.g., the presentation of marijuana use ritual, context or the consequences of use may be viewed as unreal, reducing the ad's effectiveness, Fishbein et al., 2002) and feeling inspired maybe a spurious factor. Subsequent studies may pay special attention to the possible mechanisms to explain the negative impact of marijuana scenes on ad evaluation and even behavioral intention.

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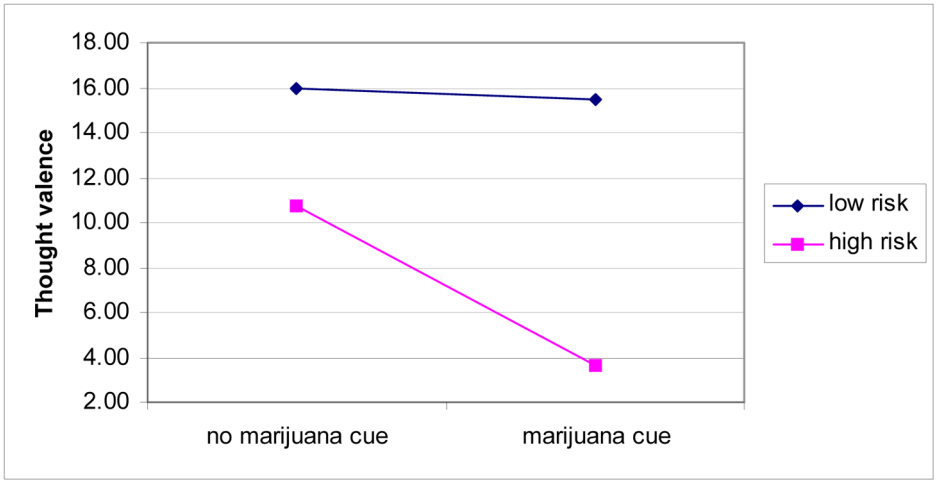

Figure 1.
Impact of marijuana scenes and risk of marijuana use on thought valence

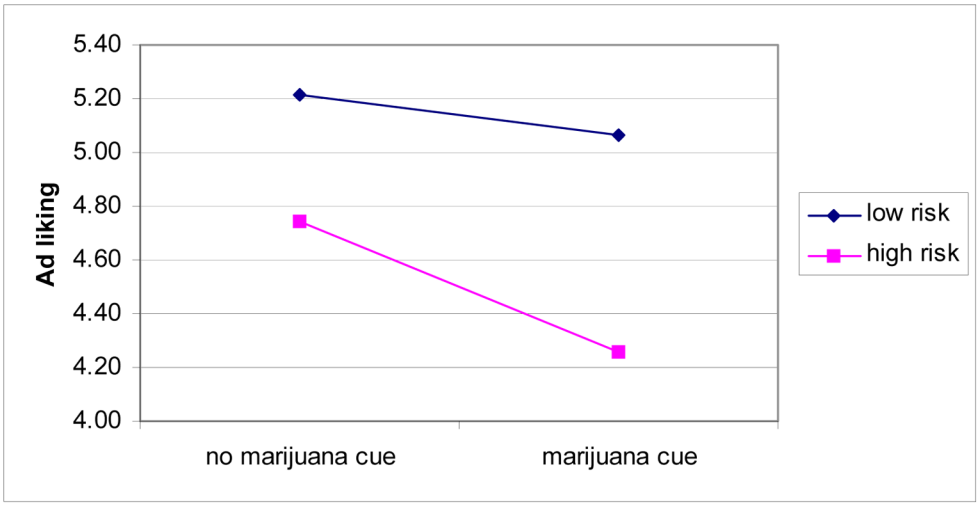

Figure 2.
Impact of marijuana scenes and risk of marijuana use on ad liking

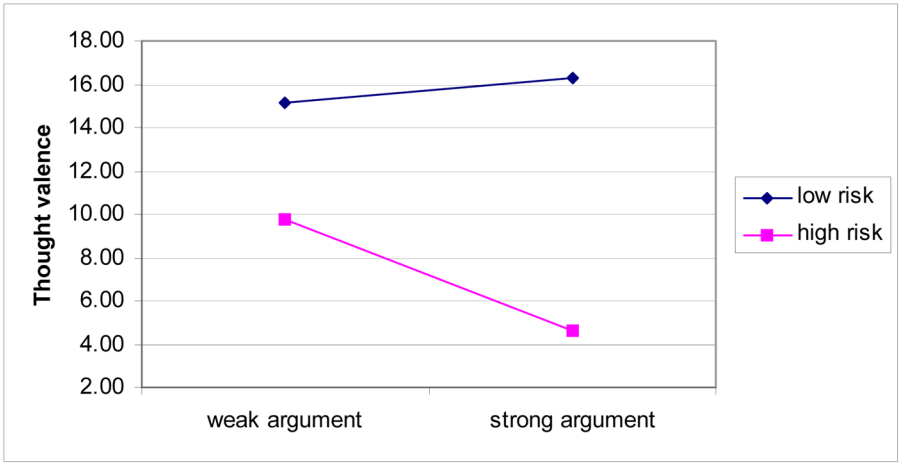

Figure 3.
Impact of argument strength and risk of marijuana use on thought valence

Table 1

Means of Perceived Ad Effectiveness, Ad Liking and Thought Valence by Marijuana Scene, Argument Strength and Risk of Marijuana Use

Risk of marijuana use	Argument strength	Marijuana scene	Perceived ad effectiveness	Ad liking	Thought valence	*N*
Low	Low	No	3.57 (.17)	5.17 (.32)	14.71 (5.41)	14
		Yes	3.54 (.35)	5.04 (.65)	14.69 (10.15)	16
	High	No	3.62 (.24)	5.22 (.39)	16.50 (6.60)	22
		Yes	3.60 (.22)	5.18 (.32)	17.50 (4.60)	8
High	Low	No	3.17 (.28)	4.68 (.55)	10.43 (8.30)	14
		Yes	3.11 (.30)	4.33 (.52)	5.81 (9.49)	16
	High	No	3.26 (.27)	4.73 (.56)	10.32 (8.54)	22
		Yes	3.16 (.14)	4.31 (.72)	3.88 (9.91)	8

Note: Values in parentheses are standard deviations.