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The Effectiveness of Gateway Communications in Anti-Marijuana Campaigns

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Abstract

Successful anti-marijuana messages can be hypothesized to have two types of effects, namely persuasion effects, that is, a change in people's beliefs about using marijuana, and priming effects, that is, a strengthened correlation between beliefs and associated variables such as attitude and intention. This study examined different sets of anti-drug advertisements for persuasion and priming effects. The ads targeted the belief that marijuana is a gateway to stronger drugs, a belief that is often endorsed by campaign planning officials and health educators. A sample of 418 middle and high school students was randomly assigned to a control video or one of three series of ads, two of which included the gateway message in either an explicit or implicit way. Results did not support the use of the gateway belief in anti-marijuana interventions. Whereas no clear persuasion or priming effects were found for any of the ad sequences, there is some possibility that an explicit gateway argument may actually boomerang. In comparison to the control condition, adolescents in the explicit gateway condition tended to agree less with the gateway message and displayed weaker correlations between anti-marijuana beliefs and their attitude toward marijuana use. The results suggest that the gateway message should not be used in anti-drug interventions.

Between 1991 and 1999 the proportion of 12th grade students who had used marijuana in the previous year increased from 24% to 38%. Similarly strong increases in marijuana use were reported for 8th and 10th grade students (Johnston, O'Malley, & Bachman, 2000). The U.S. Congress responded to these trends by appropriating substantial amounts of money for the development of a national media campaign to prevent the use of marijuana and other illicit drugs among adolescents (ONDCP, 1997a). The development and evaluation of such anti-drug campaigns can benefit from the use of theory. Two perspectives in particular may prove useful, namely theories of behavior change and media priming theory.

Theories of Behavioral Change: Persuasion Effects

Research on health education and health promotion suggests that only a limited number of variables need to be considered if one aims to influence adolescents' marijuana use (see Fishbein et al., 2001). These variables are central in theories of behavior change that have

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widely been applied in prevention research, namely the Health Belief Model (Janz & Becker, 1984; Rosenstock, 1974), Social Cognitive Theory (Bandura, 1986) and the Theory of Reasoned Action (Fishbein & Ajzen, 1975). Recently, an Integrative Model (IM; Fishbein, 2000) was proposed that incorporates the major determinants of intention and behavior delineated in these theories. Relevant for the present research the integrative model proposes that performance of a behavior is most likely to occur when people form a strong intention to perform that behavior. Intention itself is determined by attitude, perceived norms, and self-efficacy concerning performing the behavior. These three psychosocial variables (i.e., attitude, perceived norms, and self-efficacy) are, in turn, viewed as a function of beliefs that performing the behavior will lead to positive or negative outcomes (outcome beliefs), that specific referent groups or individuals think one should or should not perform the behavior (normative beliefs), and about one's ability to perform the behavior under difficult circumstances (efficacy beliefs).

According to the IM, if people have not formed a strong intention, the underlying beliefs should be changed in order to bring about behavior change (Fishbein, 2000). In effect, belief change leads to changes in attitude, perceived norms, and/or self-efficacy, which in turn lead to a change in intention, which leads to a change in behavior. From this it follows that those designing anti-marijuana interventions should first identify those beliefs that are most strongly related to the intention to use marijuana, and then develop messages that aim to change these critical beliefs. In this paper we refer to changes in beliefs as persuasion effects.

Media Priming: Priming Effects

Messages can influence intention along a different route than direct belief change. Media priming refers to the possibility that a message affects the strength of the relationship between a belief and a related variable such as attitude (e.g., Domke, Shah, & Wackman, 1998; Mendelsohn, 1996; Iyengar & Kinder, 1987). More specifically, according to media priming, a message that addresses a specific outcome belief increases the salience of that belief, making the belief more accessible in memory. The increased salience of the belief is expected to strengthen the correlation between that belief and attitude.

To illustrate the process of media priming, suppose that people's attitude toward marijuana use is determined by their beliefs about negative and positive consequences of marijuana use. Suppose further that one message addresses negative outcomes of marijuana use, while a second message attempts to refute positive outcomes of marijuana use. Media priming predicts that in comparison to non-exposure, exposure to the first message alone strengthens the correlation between negative outcome beliefs and attitude, and that exposure to the second message strengthens the correlation between positive outcome beliefs and attitude.

Priming effects presumably occur because exposure to a message increases the accessibility of information that is presented in the message, and the more accessible information is the more it is used to form a judgment such as an attitude (Iyengar & Kinder, 1987). We refer to message effects on the correlation between beliefs and related variables (such as attitudes and intention) as media priming effects. It should be stressed that a message can

simultaneously yield persuasion and priming effects, that is, theories of behavioral change and priming are not mutually exclusive.

In terms of priming theory, an effective anti-marijuana campaign increases the association of negative outcome beliefs, and decreases the association of positive outcome beliefs to related variables, i.e., attitudes, intentions, and behavior. The campaign's message strategy would be to select those messages that target negative consequences of marijuana use. Targeting positive beliefs, even to undermine them, could run the risk of increasing the association between, e.g., positive consequences and attitude. This would be an undesirable result.

Selecting the Gateway Belief

An important step in designing anti-marijuana campaigns is the selection of specific beliefs that are critical to changing marijuana use. One basis for choice among beliefs to target is a strong correlation between a belief and intention (Hornik & Woolf, 1999), although media priming would suggest that a moderate correlation is sufficient. In addition, the belief must not already be strongly accepted by most of the target population. If people already believe that marijuana has many negative consequences and no positive consequences, there is little or no room for a message to change these beliefs. Furthermore, it must be possible to craft a high quality argument to change a specific belief. For example, it may prove very difficult if not impossible to change people's belief that they will have a good time with their friends if they use marijuana, because this belief is probably based on direct experience with using marijuana. How can a media message readily contradict this experience? In summary, a belief is a target candidate if the belief is relevant (i.e., correlated with attitude and intention), moveable, and changeable.

We used previous data from a mall-based touch-screen survey of 600 adolescents to select a belief that meets the aforementioned criteria. The measures in the survey included beliefs, attitude, perceived norms, self-efficacy, intentions, and self-reports of marijuana use. Based on the criteria of relevance, movability, and changeability, the outcome belief that "your regularly using marijuana will lead to the use of stronger drugs" seemed a good target belief in an anti-marijuana message. We refer to this belief as the gateway belief, because it implies that marijuana is a gateway to stronger drugs. The gateway belief was moderately correlated with attitude, intention, and self-reported marijuana use ($-.18 < r < .25$, $ps < .001$). Importantly, and in contrast to many of the other beliefs assessed in the survey, there was no universal agreement with respect to the gateway belief ($M = -0.15$, $SD = 1.51$ on a scale ranging from -2 to $+2$ where positive scores reflect agreement with the belief). Moreover, it seemed possible to provide plausible arguments and testimonials to support the gateway hypothesis. In the present research we therefore focus on the gateway belief and examine the effectiveness of a gateway message in an anti-marijuana intervention. Because the gateway belief is an outcome belief our analyses will concentrate on the gateway belief, on other outcome beliefs, and on variables that are thought to be related to outcome beliefs, namely attitude and intention towards regularly using marijuana.

Our choice of the gateway belief corresponds with considerations that guide national efforts to prevent illicit drug use. For example, the National Drug Control Strategy asserts that marijuana ... “has become almost a rite of passage for those who end up as cocaine and heroin users,” and concludes that anti-marijuana efforts are needed to prevent youth from using drugs like cocaine (ONDCP, 1997a p. 58, 59). Consistent with this, the National Youth Anti-Drug Campaign’s communication strategy starts from the observation that adolescents who use marijuana often progress to using other drugs, and concludes that “... preventing use of marijuana appears to be a powerful means for preventing other drugs” (ONDCP, 1997b. 5).

Campaign planning officials are not the only ones to subscribe to the relevance of the gateway belief. In preparation for other research in our laboratory we searched a wide variety of anti-drug web sites for personal testimonials. Of 32 anecdotes of adolescents telling about their drug use 11 made the argument that in their experience marijuana was a gateway to stronger drugs. Consider, for example, these excerpts: “I started smoking pot at 15. I never thought I would do anything harder. I was wrong. It was a gateway drug. It led to a daily habit of methamphetamines, (crack) cocaine... and many other drugs,” and “If you think you can just try it once, or you can just smoke pot, you’re so wrong.”

The potential importance of the gateway belief has also been recognized in several anti-drug ads and television shows on drug issues. For example, two ads that were put on the air by the Partnership for a Drug-Free America feature adolescents who tell about how their drug habit began with trying marijuana and progressed to being addicted to hard drugs, while they never believed that they would use anything besides marijuana. As another example, in an episode of the popular drama show “7th heaven,” the main character, a father of seven, lectured one of his daughters about how foolish she was when she tried marijuana. He argued that trying marijuana could have her end up being addicted to stronger drugs. These examples from such diverse sources suggest a widespread belief that marijuana is a gateway to other drugs.

There are, however, problems associated with the employment of the gateway belief in anti-marijuana messages. First, although there certainly is evidence that hard drug users often use(d) marijuana as well (e.g., Community Epidemiology Work Group, 2000; Golub & Johnson, 1994) there is no hard evidence that marijuana use and hard drug use are *causally* related (cf. Golub & Johnson, 2001; Miller, 1994). The absence of evidence for the gateway hypothesis potentially impairs the credibility of a message that argues for the relation between marijuana and hard drugs. The second problem is more directly related to how adolescents receive a gateway message. It is conceivable that adolescents perceive that their autonomy is undermined if a message *explicitly* tells them that marijuana is a gateway to hard drugs. This is consistent with theories of adolescent development, such as Erikson’s Theory of Identity Development (1980), which postulates that adolescents’ formation of their identity is a function of their perceived autonomy. Accordingly, an explicit message may actually backfire and move adolescents away from believing that marijuana use can lead to using hard drugs. On the other hand, a message that implicitly tells about marijuana as a gateway drug may be too ambiguous. Even assuming that the gateway argument is

important in altering marijuana attitudes and intentions, it is not at all clear whether the argument should be made in a more explicit or implicit way.

The purpose of the present study is to examine the effectiveness of the gateway argument in anti-marijuana interventions. Our focus is on adolescents' regular use of marijuana. We evaluate a testimonial video ad that explicitly claims that marijuana is a gateway to stronger drugs. As an alternative to this direct challenge to adolescents' autonomy, we also seek to evaluate the gateway argument in two more subtle formats. Two broad hypotheses are tested in the study reported here. The first evaluates the persuasiveness of the gateway argument on the outcome belief that regular marijuana use will lead to using stronger drugs. Since many beliefs about the positive and negative consequences of regular marijuana use are tightly connected, the effects of the anti-drug ads are also tested on related beliefs. The second broad hypothesis tests media priming. Does the gateway argument affect the strength of the association between beliefs and attitudes? Media priming implies a heightened correlation between a targeted belief (or its associated neighbors) and an associated variable such as attitude.

Method

The present study was conducted in the context of a larger research project on anti-marijuana ads. The present data were gathered in March 2000 in a middle school and a high school in metropolitan Philadelphia. Data were gathered from 418 students, of whom 44% were male. Mean age was 14 years ($SD = 1.89$ years). A total of 218 (52%) students were Caucasian, 139 (33%) were African American, and 59 (15%) were from other ethnic or racial groups. Since participants were randomly assigned to conditions, gender, age and ethnic background will not be discussed further.

Research Design

The research was designed as a between-subjects post-only experiment that included one control and three treatment conditions. Students were randomly assigned to one of the four conditions. The *Control* condition included a video fragment in documentary style, which featured only aspects that were irrelevant for marijuana use. The *Gateway* condition operationalized the gateway concept in an explicit way. Specifically, four anti-hard drug ads were shown in random order followed by a teenage girl's testimonial about how her trial use of marijuana led to using hard drugs. The *Implicit Gateway* condition showed two anti-hard drug and two anti-marijuana ads in random order without an explicit reference to the gateway concept. We chose the two anti-marijuana ads because they were rated as effective in an ongoing ad evaluation study, which is a separate part of the aforementioned larger research project. The combination of anti-hard drug and anti-marijuana ads was thought to provide an implicit message that the uses of soft and hard drugs are associated. The *Hard Drug* condition included the four anti-hard drug ads that were shown in the Gateway condition. However, in the Hard Drug condition these ads were not followed by the testimonial. This condition provided a test of the necessity of an explicit reference to the gateway concept for hard drug ads to have an effect on perceptions of marijuana use.¹ See Table 1 for an overview of the design and a description of the ads.

In treatment conditions, the set of anti-drug ads were embedded within the control video. To ensure that the results were not confounded with the contents of the control video, two different control videos were used. One video featured excerpts from a documentary on making television programs, the other featured excerpts from a Bill Nye show on science education. The two videos had no differential effects. We therefore pooled conditions together that featured either the first or the second control video.

Procedure

Prior to the study, school staff provided parents with information about the study and a parental consent form. Those students for whom parental consent was obtained were scheduled to participate in one of the study sessions. Upon arrival for their session students were asked to sign an assent form. Parents and students were given the unconditional choice of not participating.

All videos and the questionnaire were programmed onto a laptop computer using an interactive program that allows random ordering of questions and videos within blocks (Jarvis, 1998). Study sessions consisted of groups of up to 18 students and were conducted in a school's classroom or library. To ensure students' privacy during administration, students were seated apart from one another and wore headphones throughout the study session.

Measures²

To measure intention to use marijuana, participants first were asked how likely it is that they would use marijuana even once or twice in the next 12 months using a four-point scale with end points "I definitely will not" to "I definitely will". Those that gave any answer other than definitely will not were then asked to indicate how likely it is that they would use marijuana nearly every month in the next 12 months (1 = "I definitely will not" to 4 = "I definitely will"). The resulting intention measure was a four-point intention scale with categories "definitely will not try", "definitely will not use regularly", "probably will not use regularly", and "probably or definitely will use regularly".

Four 7-place semantic differential items were used to assess attitude. The stem "Your using marijuana nearly every month for the next 12 months would be:" preceded the scales "bad-good", "dumb-smart", "unenjoyable-enjoyable", and "unpleasant-pleasant". The mean of the four items was used as an indicator of attitude toward regular marijuana use, $\alpha = .89$.

Thirty-six outcome beliefs were assessed. The specific beliefs were chosen based on earlier research and on content analysis of the anti-drug ads that were used in the research project. The stem "How likely is it that the following would happen to you if you used marijuana nearly every month for the next 12 months?" preceded the beliefs about favorable and

¹Differences between the conditions in presentation mode have two implications that merit attention. First, while the gateway message was delivered by means of a testimonial, the control videos did not include a testimonial format, thus impeding a direct comparison of these conditions. Second, while four anti-drug ads were used in all three experimental conditions, an additional testimonial was used in the Gateway condition. Therefore, a difference between the experimental conditions would not necessarily be a function of the content of the testimonial but could also reflect a dosage effect, i.e., an effect of watching four ads (Implicit Gateway and Hard Drug condition) or five ads (Gateway condition).

²A complete copy of the questionnaire is available by writing to the first author.

unfavorable outcomes. The beliefs were rated on a 5-point scale ranging from “very unlikely” to “very likely”. Examples of the beliefs are “damaging the brain”, “loss of friends”, “fitting in with a preferred group”, and “starting using stronger drugs”. The latter belief that marijuana use leads to the use of stronger drugs is central to the present study, and is referred to as the gateway belief. The outcome beliefs were grouped together into four clusters representing “physical and/or mental costs” (e.g., damage my brain, become depressed, become forgetful; $\alpha = .93$), “positive outcomes” (e.g., be like the coolest kids, have a good time, get away from my problems; $\alpha = .75$), “social costs” (e.g., lose friends, feel lonely, upset parents; $\alpha = .88$), and “costs to self-esteem” (e.g., mess up my life, be a bad role model, do worse in school; $\alpha = .93$). The gateway belief was categorized as a physical/mental cost.

Results

Note that before performing the analyses the attitude measure was recoded to range from -3 to $+3$, and all other measures but intention were recoded to range from -2 to $+2$. For all constructs but the outcome beliefs, higher scores indicate a more favorable position towards marijuana use. For beliefs about negative and positive outcomes, higher scores reflect a higher perceived likelihood that marijuana results in the particular outcome.

Descriptive Analyses

Table 2 presents descriptive statistics of the key variables. For easy reference the belief scales instead of the single beliefs are included in Table 2. In general, the adolescents in our sample have very low intentions to use marijuana and a negative attitude toward marijuana use. Negative outcomes of marijuana use are perceived as somewhat likely and positive outcomes are seen as somewhat unlikely. Attitude relates strongly to intention, and the outcome belief scales relate to attitude. The three negative outcome scales correlate strongly with each other, but only moderately with the positive outcome scale.

Persuasion Effects

We subjected the gateway belief to a univariate analysis of variance because the treatment conditions specifically addressed the belief that using marijuana leads to the use of hard drugs. Then, a number of multivariate GLM procedures (analyses of variance) were employed to examine the effects of the ads on variables that conceptually and empirically cluster together. The clusters were (1–4) the single beliefs that make up each of the four belief scales, and (5) the direct measures of intention and attitude.

There was no effect of the treatment conditions on the gateway belief, $F(3, 411) = 1.16, ns$. The means show that students generally thought that the gateway idea was somewhat likely, $M_{\text{control}} = .44$, $M_{\text{gateway}} = .12$, $M_{\text{implicit gateway}} = .37$, and $M_{\text{hard drugs}} = .45$, measured on a -2 to $+2$ scale. If anything, acceptance of the gateway belief was lower in the explicit gateway condition than in the control condition, although not at a statistically significant level, $t(280) = 1.66, p = .10$.

Because the ads targeted specific beliefs rather than general constructs, we expected stronger effects on the beliefs than on attitude and intention. In contrast to expectations, however,

none of the multivariate effects for Condition on the beliefs were significant. For the single beliefs of the physical costs scale $F(13, 399) = 1.04$, *ns*, for the positive outcomes beliefs $F(7, 406) = .75$, *ns*, for the social costs beliefs $F(6, 407) = .83$, *ns*, and for the self-esteem costs beliefs $F(10, 404) = 1.07$, *ns*. In addition, there was no significant multivariate effect for Condition on the intention–attitude cluster, $F(2, 409) = .34$, *ns*. It must be noted that although non-significant, all effects suggested that compared to the Control condition, means in the Gateway condition were *more* positive towards marijuana use.

Persuasion Effects and the Role of Being at Risk for Marijuana Use

It is conceivable that anti-drug ads are most effective for people who are at risk for marijuana. To explore this possibility, we used a measure of being at risk for marijuana use to construe a variable labeled Risk Group (1 =relatively low risk, 2 =relatively high risk). The risk measure was based on prior marijuana use. Since it was not feasible to assess prior marijuana use in a school setting, we used behavioral data from an independent survey on adolescent marijuana use ($N = 600$). In that survey, marijuana use significantly correlated with age, the number of times marijuana was offered, the number of friends who use marijuana, and sensation seeking (a drive for novel and intense sensations and experiences; see Zuckerman, 1990). The equation parameters were applied to the corresponding variables in the present data to create a risk measure. This was appropriate because the survey and the present study used identical measures to assess age, sensation seeking, times offered, and friends' use. Also, the present sample matched the survey sample on age, gender, and ethnicity. The 75% lowest scores on the risk measure were classified into the low risk group, and the 25% highest scores on the risk measure into the high risk group. This cut-off score matched the proportion of people who actually had used marijuana in the last 12 months (about 25% for 11–19 year old adolescents).

We tested multivariate GLMs with Condition and Risk Group as independent variables. A significant Condition by Risk Group interaction would suggest that the effects of the anti-drug ads are different for the two risk groups. None of the interaction terms, including the interaction effect on the gateway belief, were significant, and, as observed before, none of the Condition main effects were significant. In marked contrast, all main effects for Risk Group were significant. Not surprisingly, adolescents at high risk were more favorable toward marijuana use than adolescents at low risk. For example, 31% of adolescents at high risk intended to use marijuana regularly, whereas only 2% of adolescents at low risk intended to regularly use marijuana.

Priming Effects

The ads addressed negative outcome beliefs about using marijuana and/or hard drugs. We therefore expected a priming effect of the ads for negative outcome beliefs, but not for positive outcome beliefs. To test for priming effects, we examined the association between the gateway and other outcome beliefs with attitude and intention. Because there are no theoretical expectations that these associations differ in strength for each of the negative belief scales, and because of the strong intercorrelations between the negative belief scales (see Table 1), we examined zero-order correlations instead of regression weights. Specifically, within each condition the single gateway belief and the four outcome belief

scales, i.e., the three negative and one positive outcome scales, were correlated with attitude and intention. Fisher Z transformations were then employed to compare the correlations between conditions.

Priming the Gateway Belief

Using different formats, all three treatment conditions addressed the gateway argument. We therefore expected an elevated correlation between the gateway belief and attitude in the treatment conditions compared to the Control condition. The results do not support our expectation. In the Gateway condition, the gateway belief is significantly stronger related to attitude than in the Hard Drug condition. However, the expected key effect of a stronger gateway belief—attitude correlation in the treatment conditions compared to the Control condition—is not present (see Table 3).

Priming Outcome Belief Clusters

Moving from the gateway belief to the outcome belief clusters, we expected that the focus on negative outcome beliefs in the ads would strengthen the correlation between the negative outcome belief clusters with attitude and intentions. Our results do not confirm this hypothesis. The negative belief clusters were not less strongly associated with attitude or intention in the Control condition than in any of the treatment conditions (see Table 3 for the results for all outcome clusters). However, correlations between both negative and positive belief clusters and attitude were significantly weaker in the Gateway condition than in the Control condition. A similar, but less manifest pattern of results was found for the association between belief clusters and intention. These results run counter to the priming hypothesis. In fact, it may be indicative of a kind of boomerang effect in the sense that exposure to an explicit gateway message decouples beliefs and attitude, that is, it attenuates the association between beliefs and attitude.

Ancillary Analyses of the Decoupling Effect of Priming

We further explored the nature of the decoupling of the belief clusters and attitude/intention in the Gateway condition. We focused on the correlations of the belief clusters with attitude, because these correlations were most indicative of a decoupling effect. Recall that a correlation between any two variables x and y is the ratio of the covariance between x and y (cov_{xy}), and the product of the standard deviations of x (SD_x) and y (SD_y). Accordingly, different correlations between the Control and Gateway condition can be a result of differences in association ($cov_{beliefs, attitude}$), variability in belief scores ($SD_{beliefs}$), and/or variability in attitude scores ($SD_{attitude}$). Here, we tested differences in covariances and variance (SD) for statistical significance. Note that this approach offers a detailed examination of differences in correlation, but does not serve to disentangle persuasion from priming effects, that is, mean changes from changes in correlations.

Negative Outcome Beliefs

Our results show that for the negative outcome clusters the differences in $cov_{beliefs, attitude}$ between the Control and Gateway conditions were very small (for physical costs $cov = -.57$ vs. $-.52$, for social costs $cov = -.69$ vs. $-.67$, for self-esteem costs $cov = -.68$ vs. $-.53$; all

differences *ns*). The results also suggest that $SD_{attitude}$ does not differ between the Control ($SD = 1.22$) and Gateway conditions ($SD = 1.29$; difference *ns*). However, for each of the three negative outcome clusters $SD_{beliefs}$ was significantly lower in the Control condition than in the Gateway condition (for physical costs $SD = .85$ vs. 1.26, for social costs $SD = 1.00$ vs. 1.21, for self-esteem costs $SD = .94$ vs. 1.21). It thus appears that for the negative outcome clusters the attenuated correlations with attitude in the Gateway condition reflect increased variability of belief scores in the Gateway condition rather than a weakened association.

We considered the $SD_{beliefs}$ for the negative outcome clusters in more detail to get to the core of the decoupling effect. Could it be that the $SD_{beliefs}$ differed especially for adolescents at risk for marijuana use? Ancillary analyses suggest that at-risk adolescents in the Gateway condition move toward disbelieving that regular marijuana use has negative outcomes. This is a subtle and important effect given that no differences in means were found between the conditions or even the condition by risk groups, and because marijuana use is especially relevant for the high risk group.

Positive Outcome Beliefs

Turning to the positive outcome cluster, the $SD_{beliefs}$ did not differ between Control and Gateway condition, $SD = .80$ vs. .84. Here, a lower $cov_{beliefs, attitude}$ in the Gateway condition ($cov = .29$) than in the Control condition ($cov = .42$) was responsible for the attenuated correlation with attitude, which reflects an actual disassociation.

In sum, although some differences in correlations were found, these differences are not in support of media priming hypotheses. If anything, an explicit gateway message actually seems to decrease the association between outcome beliefs and attitude.

Discussion

In this paper we examined the effectiveness of anti-marijuana interventions that target the belief that marijuana is a gateway to stronger drugs. Sets of ads that implicitly or explicitly utilized the gateway concept or that focused solely on hard drugs were evaluated as to their effectiveness in yielding persuasion effects and priming effects. The results show that neither the gateway ads nor the hard drug ads had any effects. That is, neither the explicit nor the implicit gateway ads positively changed the gateway belief or any other determinant of marijuana use, nor did the ads yield stronger relationships between determinants of marijuana use.

Interpretation of the Findings

Do the present results mean that we should move away from using the gateway concept in anti-marijuana interventions? There are several possible explanations for the findings that should be addressed before this question can be answered. First, it must be recognized that most adolescents in our sample neither intended to use marijuana regularly (91%) nor to even try marijuana (68%). The immediate implication is that for the vast majority of the sample there was no room for the ads to lower intention to use marijuana. The little variance in intention may also have resulted in the moderate correlation between the gateway belief

and intention, which would have attenuated a change in intention as a result of a change in the gateway belief. While these observations do not necessarily imply that the gateway belief and other variables were unmovable, it underscores how difficult it was for the ads to positively affect adolescents who already were inclined to stay away from marijuana.

The distinction between adolescents who are at low and high risk for marijuana use may also have been important in terms of how adolescents perceive the gateway belief. It is reasonable to assume that some adolescents at high risk have previously used marijuana, but that most of these adolescents have not gone on to use stronger drugs. For this group, the gateway message is a weak argument, because it runs counter to their experience. Our data supported this contention. Across all conditions, adolescents at high risk thought it to be somewhat *unlikely* that marijuana use leads to the use of stronger drugs ($M = -.31$) while adolescents at low risk believed that this outcome was somewhat *likely* ($M = .55$; scale ranges from -2 to $+2$, with 0 =neither agree nor disagree), $t(410) = 4.97$, $p < .001$. This result was the same for the four conditions. In sum, the data suggests that whereas the gateway belief might be an important issue for marijuana use, it is contradicted by the immediate experience of users and is already pervasive for non-users.

An alternative explanation of course is that the gateway concept may be effective, but the particular ads that we used were not effective. Although it is hard to rebut this argument, previous research on the perceived effectiveness of anti-drug ads provides some evidence for the effectiveness of the ads that were used in the present study. An evaluation of 33 anti-drug ads showed that adolescents perceived the “Roaches” and “Teeth” ads and the “Gateway” testimonial as highly effective (Fishbein, Hall-Jamieson, Zimmer, von Haeften, & Nabi, 2002). All three of these ads were used in our explicit gateway condition, while “Roaches” and “Teeth” were also used for an implicit gateway message. It was also found that, in general, anti-hard drug ads were perceived as more effective than anti-marijuana ads. In addition, “Michael”, an ad that was also used for our implicit gateway message, was part of an anti-marijuana campaign conducted in Tennessee. The finding that the Tennessee campaign changed beliefs, attitude, intention, and even behavior concerning marijuana use provides some evidence for the effectiveness of “Michael” (Stephenson et al., 1999). Notwithstanding the effectiveness of the ads, some problems remain. For example, it is not clear whether the specific combination of the ads affected the effectiveness of the total set. Also, we were not able to determine that the ads in the implicit gateway condition led participants to form an association between marijuana use and the initiation of stronger drugs.

An explanation of the present findings in terms of the dynamics of drug use is more directly related to the gateway concept. In the present study we examined whether anti-hard drug ads would generalize to marijuana use. Results from the Monitoring the Future studies, however, suggest that this approach may be problematic (Johnston, O’Malley, & Bachman, 2000). Johnston and his colleagues showed that trends in use are divergent for different drugs and that the beliefs underlying use of a particular drug are specific to the drug, which led these researchers to call for separate campaigns for different drugs. This is consistent with the assumptions of the integrative model of behavior change that guided the present study. Specifically, the integrative model postulates that the relative importance of the

determinants of a behavior is a function of the particular behavior and population under study (Fishbein, 2000; Fishbein & Ajzen, 1975). For example, crack use may be determined by beliefs that are quite different from the beliefs that determine marijuana use. The implication is that changing beliefs about marijuana does not necessarily yield changes in beliefs about other drugs and vice versa. Reasonable as this explanation may be, except for the Hard Drug condition, it cannot account for the failure of the ads to change the belief that marijuana is a gateway to hard drugs. The gateway belief is conceptually related to both marijuana and hard drug use, and therefore anti-hard drug ads that incorporate the gateway concept should potentially be able to change the gateway belief.

Implications for Anti-Marijuana Interventions

Altogether the present study does not provide clear support for the explicit or implicit use of the gateway concept in anti-marijuana interventions. Looking at differential effects for the explicit and implicit gateway message, the analyses of persuasion and priming effects suggest that an explicit gateway message may be problematic. Adolescents who were exposed to the explicit gateway message tended to agree less with the gateway message than adolescents in the control condition. Also, there was some evidence that an explicit gateway message significantly attenuates the relationship between anti-marijuana beliefs and people's attitude toward marijuana use. More specifically, at-risk adolescents reacted to the explicit gateway message by thinking that negative consequences of marijuana use are relatively less likely. Possibly, the gateway argument was contradicted by these adolescents' immediate experience that their marijuana use did not lead to the use of stronger drugs. Thus, using a message about negative consequences of unhealthy behavior carries the risk that it may backfire when it runs counter to people's experience. A more implicit gateway message did not have these potentially harmful effects, but was similarly ineffective in producing persuasion and priming effects.

The absence of persuasion and priming effects leads to the conclusion that interventions should target a different belief, or should perhaps target a set of beliefs instead of a single belief. Indeed, from a dissonance-consistency perspective it can be argued that an exclusive focus on a single belief in a set of beliefs will not produce change if that belief set is internally consistent, i.e., if the beliefs are strongly intercorrelated. Given an individual's motivation to maintain a consistent belief system, it is unlikely that an attempt to change one belief will produce changes in all related beliefs. Indeed, consistency will be maintained by keeping the targeted belief in accord with the entire set of beliefs. On the other hand, if several of the beliefs that are central to the set are changed, a consistent belief set would result from changing non-targeted beliefs. Whereas this explanation needs further research, it underscores the conclusion of the present study that an exclusive focus on the gateway belief in anti-marijuana interventions is unlikely to be effective.

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References

- Bandura, A. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, N.J: Prentice-Hall; 1986.
- Community Epidemiology Work Group. NIDA, NIH publication 00-4739. 2000. Epidemiological trends in drug abuse: Volume 1. Highlights and executive summary.
- Domke D, Shah DV, Wackman DB. Media priming effects: Accessibility, association, and activation. *International Journal of Public Opinion Research*. 1998; 10:51–74.
- Erikson, EH. Identity and the life cycle. New York: Norton; 1980.
- Fishbein M. The role of theory in HIV prevention. *AIDS Care*. 2000; 12(3):273–278. [PubMed: 10928203]
- Fishbein, M.; Ajzen, I. Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley; 1975.
- Fishbein M, Hall-Jamieson K, Zimmer E, von Haefen I, Nabi R. Avoiding the boomerang: The need for experimental tests of the relative effectiveness of anti-drug public service announcements prior to their use in a national campaign. *American Journal of Public Health*. 2002; 92:238–245. [PubMed: 11818299]
- Fishbein, M.; Triandis, HC.; Kanfer, FH.; Becker, MH.; Middlestadt, SE.; Eichler, A. Factors influencing behavior and behavior change. In: Baum, A.; Revenson, TR.; Singer, JE., editors. *Handbook of Health Psychology*. Mahwah, NJ: Lawrence Erlbaum; 2001. p. 3-17.
- Golub A, Johnson BD. The shifting importance of alcohol and marijuana as gateway substances among serious drug abusers. *Journal of Studies on Alcohol*. 1994; 55:607–614. [PubMed: 7990471]
- Golub A, Johnson BD. Variation in youthful risks of progression from alcohol and tobacco to marijuana and to hard drugs across generations. *American Journal of Public Health*. 2001; 91:225–232. [PubMed: 11211630]
- Hornik R, Woolf KD. Using cross-sectional surveys to plan message strategies. *Social Marketing Quarterly*. 1999; 5:34–41.
- Iyengar, S.; Kinder, D. News that matters: Television and American opinion. Chicago: University of Chicago Press; 1987.
- Janz NK, Becker MH. The health belief model: A decade later. *Health Education Quarterly*. 1984; 11:1–47. [PubMed: 6392204]
- Jarvis, WBG. MediaLab Research Software, Version 3.0 [computer program]. Philadelphia, PA: Empirisoft; 1998. (www.empirisoft.com)
- Johnston, LD.; O'Malley, PM.; Bachman, JG. NIDA, NIH publication 00-4690. 2000. The monitoring the future national results on adolescent drug use: Overview of key findings, 1999.
- Mendelsohn M. The media and interpersonal communications: The priming of issues, leaders, and party identification. *Journal of Politics*. 1996; 58:112–125.
- Miller TQ. A test of alternative explanations for the stage-like progression of adolescent substance use in four national samples. *Addictive Behaviors*. 1994; 19:287–293. [PubMed: 7942246]
- Office of National Drug Control Policy (ONDCP). The national drug control strategy, 1997. Washington, DC: ONDCP; 1997a.
- Office of National Drug Control Policy (ONDCP). The national youth anti-drug media campaign: Communication strategy statement. Washington, DC: ONDCP; 1997b.
- Rosenstock IM. Historical origins of the health belief model. *Health Education Monographs*. 1974; 2:1–8.
- Stephenson MT, Palmgreen P, Hoyle RH, Donohew L, Lorch EP, Colon SE. Short-term effects of an anti-marijuana media campaign targeting high sensation seeking adolescents. *Journal of Applied Communication Research*. 1999; 27:175–195.
- Zuckerman M. The psychobiology of sensation seeking. *Journal of Personality*. 1990; 58:313–345. [PubMed: 2198341]

TABLE 1

Research Design, Anti-Drug Ads used in Each Condition, and Description of Anti-Drug Ads

Condition (N)	Ad	Description of ad
Control (n =143)	None	N/A
Gateway (n =141)	Bathroom	Commercial-style song about 'meth' (methamphetamine) is played while showing skinny girl who cleans bathroom and herself in a paranoid manner, then wastes away. Lyrics to song cynically tell about how she has so much energy, doesn't need to sleep or eat, just has to get those hairs out of her face, and bugs out of her place. She needs one more hit, no time to waste.
	Roaches	A teenage boy with sores on his face lies trembling on a bed. Roaches crawl on his face. Voice-over says, "This is what it's like to be hooked on meth: Paranoid, hallucinating, schizophrenic. Sweet dreams".
	Teeth	Black-and-white clip shows girl looking in mirror. Pretty at first, she takes off make-up, false eyelashes, and finally her teeth. Final looks are appalling. Ends with text: "It's hard to face what heroin can do to you".
	Lab rats	Black-and-white clip shows laboratory rat in cage eating something. Voice-over says, "Only one drug is so addictive that 9 out of 10 lab rats use it, again and again, until dead. It's called cocaine and it can do the same to you". The rat is shown dying.
	Gateway	Testimonial of teenage girl who says that her first drug was pot. She further says, "I thought I'd never have a real problem with it, just hang out with my friends and use it. But then I'd use it by myself, need more, and it was like a doorway. Cause once I started it wasn't enough, and I'd use more, and I also smoked crack, hash, angle dust, everything. I never thought I'd be like that. I was stupid, you have to think about the consequences."
Implicit gateway (n =71)	Roaches Teeth	See Gateway condition for description
	Michael	A young man and his friends play Russian roulette while smoking pot. He loses. He's then shown in his wheelchair. He is paralyzed on one side and takes medication every day to stop his convulsions. He says, "I found out that on weed I can't think straight. I only smoked [pot] for a few months, but now I'm on drugs for life."
	Surgeon	Giggling surgeon draws on joint and asks teenage boy if he has tonsillitis. The shocked boy replies in vain that he has appendicitis. Voice-over says, "What if a joint would be in somebody else's hand. Like your surgeon, your lawyer, or your local policeman. Would you still say, marijuana is harmless?" Ends with surgeon giggling that he wants to see if he can still make a straight line with his scalpel.
Hard drug (n =63)	Bathroom Roaches Teeth Lab rats	See Gateway condition for description

TABLE 2
 Descriptive Statistics: Correlations, Means, and Standard Deviations of Key Variables

	1	2	3	4	5	6
1. Intention	1.00					
2. Attitude	.73	1.00				
3. Physical costs	-.44	-.44	1.00			
4. Positive outcomes	.34	.35	-.35	1.00		
5. Social costs	-.50	-.51	.89	-.42	1.00	
6. Self-esteem costs	-.49	-.48	.92	-.42	.90	1.00
<i>M</i>	1.57	-2.10	.84	-.55	.67	.83
<i>SD</i>	.95	1.31	1.05	.84	1.11	1.08

Note. Intention measured on 1–4 scale; attitude recoded to –3 to + 3 scale; belief scales recoded to –2 to + 2 scales. For intention and attitude higher scores indicate a more favorable position towards marijuana use. For beliefs about costs and positive outcomes, higher scores reflect a higher perceived likelihood that marijuana leads to the particular outcome.

TABLE 3
Correlations Between Outcome Beliefs and Attitude and Intention Within Conditions

Condition	Correlation with attitude				Correlation with intention			
	1	2	3	4	1	2	3	4
Gateway belief	-.32	-.37 ^c	-.27	-.22 ^c	-.31 ^a	-.36 ^b	-.36 ^c	-.06 ^{abc}
Physical costs	-.55 ^a	-.32 ^{abc}	-.54 ^b	-.52 ^c	-.51 ^a	-.36 ^{ab}	-.58 ^b	-.43
Positive outcomes	.43 ^a	.26 ^{ab}	.40 ^b	.33	.40	.28	.37	.32
Social costs	-.56 ^a	-.43 ^{ab}	-.58 ^b	-.53	-.53	-.45 ^b	-.59 ^b	-.50
Self-esteem costs	-.59 ^a	-.34 ^{abc}	-.54 ^b	-.53 ^c	-.54 ^a	-.40 ^{ab}	-.58 ^b	-.50

Note. Condition 1 =control, 2 =gateway, 3 =implicit gateway, 4 =hard drugs. For each of the attitude and intention variables, row correlations that share the same superscript differ significantly.