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AN EMPIRICAL ASSESSMENT OF THE *ABOVE THE INFLUENCE* ADVERTISING CAMPAIGN*

LAWRENCE M. SCHEIER, PH.D.
LARS Research Institute, Inc., Las Vegas, Nevada and
Washington University School of Medicine, St. Louis, Missouri

JERRY L. GRENARD, PH.D.
Claremont Graduate University, California

KRISTEN D. HOLTZ, PH.D.
KDH Research and Communication, Inc., Atlanta, Georgia

ABSTRACT

This study evaluated the efficacy of *Above the Influence* (ATI), a national media-based health persuasion campaign to deter youth drug use. The campaign uses public service anti-drug prevention messages and targets youth between the ages of 14 and 16, a period of heightened susceptibility to peer influences. The evaluation utilized mall intercepts from geographically dispersed regions of the country. Theoretical impetus for the campaign combines elements of the theory of reasoned action (TRA), persuasion theory, and the health belief model. A series of structural equation models were tested with four randomly drawn cross-validation samples (N = 3,000). Findings suggest that awareness of ATI is associated with greater anti-drug beliefs, fewer drug use intentions, and less marijuana use. Congruent with the

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TRA, changes in beliefs and intentions are intermediate steps linking campaign awareness with behavior. This study provides further evidence of positive campaign effects and may strengthen reliance on mass media health persuasion campaigns as a useful adjunct to other programs targeting youth.

INTRODUCTION

The National Youth Anti-Drug Media Campaign (NYADMC) goes on record as the largest ever government funded, health persuasion media campaign. Taking place in its earliest form from 1999 through 2004, the campaign reflected the urgent need to shape and enact a public health agenda targeting youth drug use. Even with the massive outlays of funding to jumpstart the media campaign, evaluations have produced mixed reviews. Some have suggested the media campaign produced "boomerang" effects (Hornik, 2000; Hornik, Jacobsohn, Orwin, Piesse, & Kalton, 2008; Hornik, Maklan, Cadell, Barmada, Jacobsohn, Henderson, et al., 2003; Orwin, Cadell, Chu, Kalton, Maklan, Morin, et al., 2005), while more recent evaluations modeling developmental trajectories over time indicate specious but positive effects (Scheier & Grenard, 2010). Given the large financial outlay and the tremendous effort put into dissemination of the campaign messages it is prudent to search for additional evidence of media campaign efficacy.

This article examines one such evaluation effort using mall intercepts conducted in geographically diverse regions of the country. Mall intercepts are commonly used marketing strategies to acquire additional insight into consumer behavior and represent an important tool for shoppers to express their opinions on product marketing and consumer preferences. As we explain below, the media campaign targeted a specific audience and mall intercepts represent one of several strategies to learn more about the breadth and reach of the campaign. This article briefly reviews historical information on the campaign, addresses the theoretical foundations of the campaign, highlights the utility of mall intercepts, and then describes an evaluation of the campaign using mall intercepts.

Historical Background of the Media Campaign

In 1998, and in response to the public health mandate to suppress youth drug use, the U.S. Congress authorized expenditures for the National Youth Anti-Drug Media Campaign (NYADMC). These expenditures were part of the National Drug Control Policy, and oversight for the project was provided by the Office of National Drug Control Policy (ONDCP, 1998). The NYADMC uses paid media and public service communication to reach youth between the ages of 14 and 16 with drug prevention messages to discourage initiation as well as encouraging occasional users to stop their use of illicit drugs. The media campaign was developed in concert with a panel of experts who made sure the messages were

evidence-based and supported by the latest scientific research in behavior modification, communication, and prevention. Campaign materials go through extensive theory-based "copy testing" including experimental field trials contrasting beliefs and attitudes of youth viewing ads (DraftFCB, 2005; Fishbein, Hall-Jamieson, Zimmer, von Haeften, & Nabi, 2002) and must show no negative effects before reaching the public.

The early media campaign, running from 1999 through 2004, was branded "*My Anti-Drug*" and focused, in part, on the perceived negative social, academic, psychological, and health consequences of drug use, particularly marijuana use. Other various message platforms for the campaign included resistance skills and self-efficacy (enhancing personal and social skills and promoting drug resistance skills), normative education (correcting misperceptions about how many youth really use drugs), and teaching youth they can intervene with friends who may be using drugs. Evaluation of the *My Anti-Drug* campaign using a nationally representative household survey (The National Survey of Parents and Youth) of youth and their parents suggested that *My Anti-Drug* did not produce positive effects on youths' marijuana use, attitudes, perceived social norms regarding marijuana use, or resistance skills (Hornik et al., 2003). Spurred by consideration that campaign effects may be specious (Hornik et al., 2008), subsequent and more fine-grained analyses of the *My Anti-Drug* campaign found that messages emphasizing negative consequences of marijuana use, running from October 2002 through June 2003, significantly reduced favorable marijuana beliefs, attitudes, and lowered drug use in high sensation seeking youth (Palmgren, Lorch, Stephenson, Hoyle, & Donohew, 2007).

The introduction in 2005 of a rebranded *Above the Influence* (ATI) campaign signaled a strategic shift to include messages appealing to personal autonomy and aspirations and greater balance between the perceived negative consequences of drug use and positive results from avoiding drugs. To guard against any normalizing of drug use, a narrower focus on older teens, ages 14-16, that were more likely to have direct experience with drug use compared to younger age youth, became the target of advertising. In addition, the message content focused almost exclusively on marijuana use. Extensive research shows the campaign has high levels of reach and frequency (Longshore, Ghosh-Dastidar, & Ellickson, 2006; Orwin et al., 2005) reaching 97% of youth 95 times per year from 2005 through 2008 (average exposure of 2.5 ads per week).

Theoretical Background for the Media Campaign

Theoretically speaking, the largest influence shaping the direct content of campaign messages comes from the theory of reasoned action (TRA) (Ajzen & Fishbein, 1973, 1977, 1980). Briefly, TRA outlines a model of overt behavioral action using attitudes and beliefs as predictors of intentions to act. Attitudes are formulated as favorable or unfavorable subjective evaluations of a specific

behavior (e.g., staying drug-free should help me achieve my personal goals) and were conceived as learned predispositions to act in a certain way toward an object or behavior (Ajzen & Fishbein, 1970). Youth learn about drugs either through vicarious observation or direct role modeling and use this information to evaluate whether smoking marijuana is good or bad, important or unimportant, and pleasant or unpleasant.

Beliefs, on the other hand, involve subjective norms regarding approval or disapproval of a behavior by important referent others. In other words, beliefs reflect social expectations from peers or significant others of what an individual "should do" or how they "should perform" in a given situation (should I smoke to look cool and is it acceptable?). Beliefs also entail the anticipated positive or negative consequences from engaging in the behavior. Youth then piece together subjective evaluations with their belief in whether the behavior is sanctioned by their friends or parents (socially normative beliefs).[1] The two cognitive pieces form an expectancy regarding the anticipated effects of smoking marijuana (smoking will make me look cool and gain friends).

The theory of reasoned action also posits that intentions mediate the influence of subjective evaluations (i.e., attitudes) and normative proscriptions on behavior. Intentions represent a willingness to engage in the behavior in question and provide an index of "effort" or how hard someone is willing to try in performing a behavior. From a messaging standpoint, behavioral intentions entail the desire to smoke marijuana, to accept offers to use drugs, to hang out with peers who use drugs, or not avoid situations where drugs may be prevalent. According to TRA, neither attitude nor beliefs directly influences behavior, but rather both "*prime*" the individual to act indirectly through intentions or willingness to engage behavior. The different pieces of TRA fall neatly into value expectancy or subjective expected utility framework where the instrumental importance of the act (i.e., maximizing gain and minimizing loss) guides behavior (Edwards, 1954; Feather, 1959a).

Another prominent feature of campaign messaging accentuates the Health Belief Model (HBM) (Becker, 1974; Becker, Drachman, & Kirscht, 1974; Becker & Maiman, 1983; Maiman & Becker, 1974; Rosenstock, 1974). A cornerstone feature of the HBM involves weaving together subjective expected utility (e.g., Edwards, 1954, 1955) and related expectancy-value theories (Feather, 1959b) to build a behavioral decision making model based on perceived utility and incentive

[1] An additional component of TRA involves the motivation to comply with the norm (the latter component algebraically multiplied by beliefs in the formula predicting behavior). Motivation to comply involves a measure of the strength of the social sanctions to commit the act in question (i.e., the norms governing the behavior and the desire to conform to these norms). This component generally evidences a high association with belief and in many cases does not contribute unique variance to the prediction of behavior. For the present study, no measure of motivation to comply was included.

evaluation. The HBM highlights an individual's appraisal of threat, their own perceived susceptibility, and how this influences behavioral choice. In the case where an individual is faced with a choice that can conceivably eliminate pain or reduce severity of harm, and alternatives are valued as attractive, the likely outcome conveys reinforcing properties through the incentive valuation or benefits associated with reduced harm. In the present context, youth are told that drugs increase their risk of failure, particularly emphasizing loss of friends, damage to their family life, and disruption of their life's goals. In short, the emphasis on personal autonomy and being "Above the Influence" means lowering one's susceptibility to problems from smoking marijuana by making good choices, engaging pro-social behaviors, and staying away from negative peer influences that convey harm.

Utilizing the Mall Intercept

Shopping mall intercepts have been used since the inception of the campaign to collect ongoing tracking data monitoring the impact of the campaign messages on the target audience. This assessment arm is distinct from the in-home national evaluation mentioned above. Mall intercepts are recognized industry-wide as a useful and cost-effective means of data collection for product marketing and have a long history in consumer merchandising (Bush & Hair, 1985; Gates & Solomon, 1982). Mall intercepts quickly became a viable tool for marketing studies following the proliferation of suburban shopping malls in the 1980s (Frost-Norton, 2005). Usually mall intercepts are staged around selection of the n^{th} individual who crosses an imaginary physical boundary or some other quasi-random means of selection to assure demographic representation (i.e., quota sampling techniques). Until the advent of the Internet, mall intercepts were second only to phone surveys in usage by marketing research practitioners (Lehmann, 1989). They are primarily used to gather information on taste or product preferences, shopping experiences (Michon, Yu, Smith, & Chebat, 2007), with extensions of this approach to studies of consumer well-being (Sirgy, Lee, Grzeskowiak, Chebat, Johar, Hermann, et al., 2008). Even with their wide utility, intercept studies are not without criticisms owing to problems assuring a representative (probability) sample, frequency or "*coverage*" bias at some retail locations, and other drawbacks that may contribute to sampling estimate differences between traditional telephone, mail, or in-home survey methods (Black, Zastowny, Green, Adams, & Lawton, 1994; Bush & Parasuraman, 1985; Cowan, 1989; Nowell & Stanley, 1991).

Despite these concerns, the complete anonymity of mall intercepts may promote more truthful responding where confidentiality is at issue. This is particularly true with self-report drug use data where youth may be wary if their parents or some other authority can examine their answers. In mall intercepts, the subject is not asked any personally identifying questions, thus assuring

complete anonymity. Furthermore, in many cases mall intercepts use computers or television screens, providing a means to test visual products like those used in the media campaign. This vehicle provides a means to test copy recognition for campaign ads, establishing reach by recall of the campaign logo images, internet banner ads, and website homepages. This was part of the rationale used by Black and colleagues (1994) for using mall intercepts to learn more about how strongly public service ads resonated among youth (ages 13 to 17) during the early stages of the media campaign.

METHOD

Overview of the Mall Study

A total of 25 malls participated in the data collection, which was spearheaded by Millward Brown, an international, full-service, research company with expertise conducting mall intercepts. Large malls with available market research facilities were selected with recruitment quotas set to match ethnicity, age, and gender requirements (50% for male and female participants). The intercept facilities were evenly distributed throughout the country geographically, with five located in the northeast, eight located in the south, five in the Midwest, and seven in the west. Regional sample quotas were set to census data: 19% in the Northeast, 23% in the Midwest, 36% in the South, and 22% in the West. Ethnic quotas, again matching census information, were set to 69% other (including White, not Hispanic, American Indian, or Alaskan Native), 13% African American, 14% Hispanic, and 4% Asian. Data for this study were collected between November 2005 and January 2008 based on a rolling recruitment strategy with the goal of achieving 100 youth per week between the ages of 14 and 16 over a 1-year period. Youth were offered a monetary incentive of $3.00 for their participation, which took on average 15 minutes to complete.

The study was vetted through a federally approved commercial IRB and received a waiver of written consent. The waiver was based on minimal risk, absence of intrusive questions, the practicality of conducting such a large national study with written consent, and provision of full disclosure and information sheets to all participants and their parents. Consent and assent was obtained verbally and information sheets were provided to all youth that explained the study protocols. In the event a youth was accompanied by a parent or guardian, the parent was asked to provide verbal consent for their child's participation, which was voluntary. Once youth agreed to participate they were escorted to a research facility inside the mall where they were given access to a touch-screen computer that presented to them a series of questions. Data collection was strictly anonymous and only a few basic demographic items were asked at the end of the survey (i.e., age, last completed grade, racial self-identification, family living situation, gender, type of school attended, and their residential zip code).

Measures

Media Campaign Awareness and Exposure

The media campaign used a wide range of media outlets to disseminate the public health message including television, radio, newspapers, magazines, billboards, transit ads, bus shelters, movie theaters (trailers), video rentals, Internet sites, Channel One broadcasts conducted in schools, and other venues. To capture these various outlets, four dichotomously coded "yes/no" items were summed to create a unit-weighted measure of general media campaign awareness. The items were identical to those used in the in-home computer-assisted household survey (NSPY) and tapped "brand" awareness, asking youth if they remember seeing any anti-drug advertising, that specifically mentions not acceding to peer pressures to use drugs, that mentions the "anti-drug," or mentions "Above the Influence" (range 0 to 4). Separately, a measure of specific recall was based on participants viewing still pictures from media campaign television ads presented on the computer monitor. Presentation order for five ads was randomized and respondents indicated whether they had seen the ad ("1") or not ("0"). These were then summed to create a specific recall score (range 0 to 5). This measure comports with the specific recall-aided exposure measure used in the NSPY and allows us to make direct comparisons to that methodology (Orwin, Cadell, Chu, Kalton, Maklan, Morin, et al., 2006).

A single derived variable was used to indicate exposure. This measure was computed as the difference between the current Julian date when the mall intercept occurred and the date when the campaign became available to the general public viewed as public service announcements, radio commercials, and so forth. This measure essentially captures how much of the campaign messages an individual could have potentially seen. While there is some imprecision in this measure, it is useful to control for time-varying individual differences in viewing time frames in a cross-sectional model. Failure to include such a measure would suppose that all exposure was equal and subject to a monotonic dose-response relationship.

Beliefs

Four multi-item composites were used to reflect a latent construct of "Beliefs." The four indicators tapped negative beliefs (outcome expectancies), positive beliefs, perceived normative expectations regarding the prevalence and social acceptability of marijuana use, and perceived risk associated with using marijuana. All of these measures have been a staple part of the Partnership for a Drug-Free America Attitude Tracking Survey and have high reliability and validity (Black et al., 1994; Black, Morwitz, Putsis, & Sen, 2002). Moreover, detailing the perceived risks of drug use and correcting misperceptions regarding the social prevalence of drug use (i.e., normative education) are common features of school-based drug prevention programs (e.g., McNeal, Hansen,

Harrington, & Giles, 2004) and often used to assess beneficial program effects (Botvin, Dusenbury, Baker, James-Ortiz, Botvin, & Kerner, 1992; Hansen, Derzon, Dusenbury, Bishop, Campbell, & Alford, 2010).

Negative beliefs consisted of five items tapping the perceived negative outcomes from marijuana use. Sample items include "Kids who smoke marijuana will let other people down" and "Using weed can cause you to lose interest in things that you care about." Positive beliefs consisted of five items assessing the perceived positive outcomes derived from resisting pressures to use marijuana. Sample items include, "It's important to stand up for yourself against influences that could bring you down" and "Choosing to be Above the Influence can help you overcome negative influences that you face." Subjective norms consisted of six items assessing the perceived social climate surrounding marijuana use. Sample items included "A lot of teens today are deciding to resist the influence to use marijuana" and "Teens can make the choice to be above negative influences rather than give in to them." All of the belief items used the same 10-point scale ranging from (0) *totally disagree* to (10) *totally agree* (with 5 as the midpoint). Seven items were used to form an indicator assessing beliefs in the perceived risk of using marijuana. A stem read "What is the risk of [insert statement] if someone tries marijuana even once or twice?" with sample items including "getting in trouble with the law," "losing control of themselves," and "seriously upsetting friends or family." Response formats ranged from (1) *no risk at all* to (5) *extreme risk*. An average of all five items was formed into a single composite with higher scores indicating more perceived risk associated with marijuana use.

Marijuana Intentions

Four items were used to reflect intentions to engage in marijuana use. A single item probed behavioral willingness to use marijuana in the next year ("At any time during the next year, do you think you will smoke marijuana?") with response formats including (1) *definitely yes* (2) *probably yes*, (3) *probably not*, (4) *definitely not,* and (5) *skipped question,* the latter which was recoded to missing. A second item asked, "If one of your close friends were to offer you marijuana, would you smoke it?" and used the same response format. A third item included the stem "If you were faced with a choice, how likely do you think it is that you . . ." and two questions followed asking "will be above the influences that could bring you down" and "will take a stand against being influenced to do things like smoking weed?" Response formats for these latter items ranged from (0) *extremely unlikely* to (10) *extremely likely*. The four items were then averaged to form a composite score reflecting youths' intentions to engage in drug use.

Marijuana Use

A single item assessed "how many times have you used marijuana in the past 30 days?" with response formats ranging from (0) *never through* (5) *20+ times*.

A quick inspection of the distributional characteristics of this measure (skew = 1.63) indicated a large number of non-using youth (68%) with the remainder of youth were divided up between "once" (8.7%), "2-3 times" (7.3%), "4-9 times" (4.5%), "10-19 times" (3.4%), and "20+ times" (8.2%). In light of the irregular shaped distribution, we decided to recode this measure to a dichotomous "yes/no" response.

Model Testing Strategy

Model testing proceeded using the Mplus software program with maximum likelihood estimation (Muthén & Muthén, 2006). Models were tested in two distinct phases (Anderson & Gerbing, 1988), the first step involving specification of a confirmatory factor analysis to assess the statistical reliability of a hypothesized latent construct of Beliefs. Following, we tested a series of structural equation models depicting the theoretically driven effects of the campaign on marijuana use. This included testing the TRA using a mediation framework with exposure influencing beliefs, which in turn influence intentions and finally behavior. By contrast, the campaign can affect behavior change directly, reflected by a direct path from awareness to marijuana use. Direct learning may come about as a result of youth gaining some knowledge or awareness that there is a campaign to promote alternatives to drug use (i.e., social diffusion). The specific messages incorporated in the campaign are not of essential importance, merely that there is a prevailing norm that becomes socially diffused and alters behavior (this is referred to as a process of accommodation). The latter approach would produce a significant direct path linking awareness with marijuana use without positing intervening indirect paths through any of the cognitive measures. Once a final model was obtained, multiple group models were tested separately for gender, race, and age to determine if the regression effects and factor loadings from the measurement model varied significantly between demographic subgroups. Tests of measurement and structural invariance provide evidence for the validity of effects across meaningful subgroups (Drasgow & Kanfer, 1985; Meredith, 1993). Failure to provide support for different loadings and structural coefficients between groups would imply that the campaign had equivalent effects irrespective of demographic influences.

Power and Sample Size

Given the large mall intercept sample available for the analyses, it is worth noting that there may be excessive statistical power to detect media campaign effects. Because large samples yield stable, efficient estimates, with trivially small standard errors, this increases the likelihood of any model parameter being significant. With SEM, there is the added concern that with relatively large samples test statistics are overly sensitive to model departures (Saris & Satorra, 1993; Tanaka, 1993) undermining efforts to detect true models from those reflecting statistical

artifacts (i.e., sampling error) or chance findings. This occurs because the underlying function or log likelihood used to evaluate model fit minimizes the discrepancy between sample and implied population covariance matrices and computational factors in the sample size (*N*). To offset concerns with trivially small effects being significant (and making an abundance of Type II decision errors or failing to reject an incorrect model), models were tested with four randomly drawn samples of $n = 3{,}000$. The first sample served as a calibration sample and the remaining random selections served as validation samples. This method of cross-validation is considered superior to using the single large sample and will likely yield correct interpretation of the model findings (Cudeck & Browne, 1983). Following these tests, factor loadings were constrained to equality across samples followed by similar constraints on the structural regression parameters. The fit of these constrained models was pitted against the maintained or less restrictive model and evaluated using the nested likelihood ratio difference test.

With this cross-validation framework in mind, power for the SEM is 1.0, setting the Root Mean Square Error of Approximation (RMSEA) to .05 for the null model (better framed as a "close fit") and .08 for the alternative model framed as a "mediocre fit" (MacCallum, Browne, & Sugawara, 1996). The RMSEA provides an inferential indicator of model fit or lack thereof (with known distributional properties). Even with a modicum of imprecision in point estimates of model fit, confidence intervals can be constructed around the RMSEA. Minimum sample size to achieve power of .80 with these same settings would be 434 and for power of .90 would be 571. With the degrees of freedom set to 8 based on the actual model tested instead of an arbitrarily selected number, achieving power of .80 requires 953 youths and power of .90 requires 1287 youth. Taken together, these power estimates show that, in all cases, the study is appropriately powered to find precise estimates of fit and carry out the planned hypothesis tests (the null stating there is a "poor fit" between the sample data and implied population model).

RESULTS

Sample Description and Recall Patterns

A total of 12,305 youth participated in the mall intercept study. The sample was 50.2% male and racial breakdown indicated 72% were White, 12% Black, 12.5% Hispanic, and 3.9% indicating "Other" for racial self-identification. By design, the sample was evenly distributed with respect to the different age groups with 34% reporting they were 14 years of age, and 33% each respectively in the 15- and 16-year-old groups. The sample on average was 15 years of age ($SD = .82$). Looking first at the main brand awareness and recall measures, 73% of the sample said they had seen or heard advertising against drug use, 65% said they had seen or heard advertising about resisting peer pressure, 66% said they had seen advertising mentioning the "Anti-drug," 65% said they had seen

advertising about "Above the Influence," the latter two items reinforcing relatively high levels of brand awareness. Slightly more than one-half (56%) of the youth remembered the "My Anti-Drug" logo and 65% said they remembered the "Above the Influence" logo. There were no gender differences in the proportion of males or females remembering the "Above the Influence" logo, viewing anti-drug advertising, or remembering ads highlighting the "Anti-drug." Females were more likely to recall ads emphasizing resistance and peer pressure, $^2(1) = 11.49$, p .001 (51% vs. 49% for females and males, respectively), and likewise seeing the "My Anti-Drug" logo, $^2(1) = 11.78$, p .001 (52% vs. 48% for females and males). Older youth were more likely to recall seeing anti-drug ads, $^2(2) = 15.42$, p .001 (75%, 72%, and 72% for 16-, 15-, and 14-year-old youth, respectively), more likely to have seen ads about peer pressure or resistance skills, $^2(2) = 18.29$, p .001 (67%, 64%, and 64% for 16-, 15-, and 14-year-old youth), more likely to recall "anti-drug" advertising, $^2(2) = 28.05$, p .001 (66%, 64%, and 63% for 16-, 15-, and 14-year-old youth), and more likely to recall ads with the "My Anti-Drug" logo, $^2(2) = 51.42$, p .001 (59%, 56%, and 52% for 16-, 15-, and 14-year-old youth).

Proportional analyses also showed that there were considerable racial differences in patterns of recall. White and Black youth were more likely to recall seeing anti-drug ads, $^2(3) = 81.85$, p .001 (75%, 74%, 64%, 68%, 64% for White, Black, Hispanic, and Other youth, respectively), ads mentioning the "Anti-Drug," $^2(3) = 118.46$, p .001 (69%, 61%, 57%, 57% for White, Black, Hispanic, and Other youth), ads with "Above the Influence," $^2(3) = 57.79$, p .001 (67%, 60%, 59%, 58% for White, Black, Hispanic, and Other youth), the "My Anti-Drug" logo, $^2(3) = 43.19$, p .001 (57%, 53%, 49%, 51% for White, Black, Hispanic, and Other youth), and the "Above the Influence" logo, $^2(3) = 116.19$, p .001 (67%, 62%, 55%, 55% for White, Black, Hispanic, and Other youth). Hispanic youth were least likely to recall seeing ads dealing with peer resistance, $^2(3) = 60.70$, p .001 (66%, 66%, 57%, 61% for White, Black, Hispanic, and Other youth).

Patterns of Consumption

For the total sample, 69% of the youth reported they had never used marijuana in the past 30 days (66%, 69%, and 67% in the three validation samples). Using the calibration sample to illustrate patterns of consumption among users, 9% said they used once, 7% said 2-3 times, 4% said 4-9 times, 3% said 10-19 times, and 8% said more than 20 times. Comparatively speaking, females were more likely to say they never used marijuana or report using at much lower consumption levels, $^2(5) = 70.70$, p .001, and males were more likely to report use at higher levels of consumption (e.g., 62% vs. 38% for males and females at 20+ times past month). Younger youth were more likely to report no use of marijuana, and the two older age groups (15 and 16) were more likely to report greater volume

of consumption in the past 30-day period, $^2(10) = 91.36$, p .001. Racial comparisons indicated that White and Other race groups were more likely to report not using marijuana in the past 30 days, whereas the higher levels of consumption were reported by Hispanic youth, $^2(15) = 38.07$, p .001.

Tables 1a-c contain the sample means and group difference for all of the measures used in the model. We only examined main effects for age, gender, and race given that there is no definitive reason to explore higher-order interactions. Overall, seven of the nine comparisons were significant for age and gender and five were significant for race. The multiple group models testing factor and regression parameter constraints based on race, gender, and age provide a more powerful test compared to using covariate-adjustment for demographic factors in the SEM. This approach allows us to inspect whether the respective groups differ in the theoretical processes themselves rather than merely adjust for differences in mean levels.

Psychometric Model

Prior to testing the full structural model, we tested a confirmatory measurement model with the four indicators used to reflect a latent construct of Beliefs. This model ascertains whether the latent construct is statistically reliable and psychometrically sound. As stated previously, the model was tested in four randomly drawn samples with approximately 3,000 youth in each. The CFA model indicated the four loadings were all highly significant (p .0001) and relatively large in magnitude across all four samples ($_1$ = .918 to .929 NEG; $_2$ = .937 to .947 POS; $_3$ = .908 to .915 SOC; and $_4$ = .712 to .748 RISK). Using the Werts, Linn, and Jöreskog (1974) formula for structural composites, reliability for the factor loadings were quite high (= .997) in all four samples. The overall fit of the measurement model was adequate using the calibration sample: $^2(N = 3092, 2) = 132.06$, p .0001, Comparative Fit Index (CFI) (Bentler, 1990) = .989, Root Mean Square Error of Approximation (RMSEA) (Browne & Cudeck, 1993; MacCallum et al., 1996) = .14, Standardized Root Mean Square Residual (SRMR) = .01. Taken together, the fit indices reinforce that the implied population model adequately replicated the sample data (model fit statistics for the remaining validation samples were similar and can be obtained from the first author). Although some of the fit indices exceed the desired benchmarks, it is essential to recognize that model fit is dependent on sample size and with relatively large samples ($N > 500$) trivial deviations will be significant (Mulaik, James, Alstine, Bennett, Lind, & Stilwell, 1989).

A model constraining the latent construct (Beliefs) factor loadings across the four validation samples provided an adequate fit, $^2(26) = 676.80$, p .0001, CFI = .972, RMSEA = .09, and SRMR = .03. Differences in the magnitude of the standardized loadings were trivially small and relaxing any of the constraints would not provide sufficient improvement to the overall model fit (the

Table 1a. Mean Comparisons by Age

Variable	Female(a)		Male(b)		Mean comparison*
	M'	*SD*	*M'*	*SD*	
Use MJ last 30 days	0.30	0.46	0.34	0.47	a<b
General awareness	2.71	1.42	2.66	1.41	a>b
Specific recall aided awareness	2.64	1.69	2.65	1.68	
Intention	5.66	1.62	5.50	1.68	a>b
Positive beliefs	8.62	2.36	8.21	2.54	a>b
Social expectations	7.62	1.92	7.39	2.04	a>b
Negative beliefs	8.21	2.52	7.88	2.67	a>b
Perceived risk	3.82	0.99	3.67	1.06	a>b
Number of weeks elapsed since ATI launch[1]	3.85	0.94	3.85	0.95	

Note: *Comparisons significant at the 0.05 level. [1]Variable logarithmically transformed. Multiple comparison tests adjusted using the Bonferroni procedure to control for experimentwise error rates.

Table 1b. Mean Comparisons by Gender

Variable	14(a)		15(b)		16(c)		Mean comparison*
	M'	*SD*	*M'*	*SD*	*M'*	*SD*	
Use MJ last 30 days	0.27	0.45	0.34	0.47	0.35	0.48	a<b, a<c
General awareness	2.62	1.44	2.67	1.43	2.78	1.38	a<b, b<c, a<c
Specific recall aided awareness	2.61	1.70	2.66	1.68	2.66	1.67	
Intention	5.73	1.61	5.50	1.68	5.50	1.66	a>b, a>c
Positive beliefs	8.57	2.43	8.28	2.51	8.39	2.44	a>b, a>c
Social expectations	7.64	1.98	7.40	2.03	7.47	1.94	a>b, a>c
Negative beliefs	8.32	2.53	7.89	2.65	7.91	2.60	a>b, a>c
Perceived risk	3.87	0.99	3.71	1.03	3.66	1.04	a>b, a>c
Number of weeks elapsed since ATI launch[1]	3.86	0.94	3.85	0.95	3.86	0.94	

Note: *Comparisons significant at the 0.05 level. [1]Variable logarithmically transformed. Multiple comparison tests adjusted using the Bonferroni procedure to control for experimentwise error rates.

Table 1c. Mean Comparisons by Race

Variable	Black(a)		Hispanic(b)		White(c)		Other(d)		Mean comparisons*
	M'	*SD*	*M'*	*SD*	*M'*	*SD*	*M'*	*SD*	
Use MJ last 30 days	0.34	0.47	0.35	0.48	0.31	0.46	0.33	0.47	
General awareness	2.61	1.36	2.37	1.56	2.77	1.39	2.44	1.56	c>a, c>b, c>d, a>b, a>d
Specific recall aided measure	2.59	1.64	2.40	1.69	2.71	1.69	2.31	1.69	c>a, c>b, c>d, a>b, a>d
Marijuana intentions	5.50	1.61	5.48	1.69	5.61	1.65	5.54	1.59	c>b
Positive beliefs	8.42	2.48	8.31	2.61	8.44	2.44	8.36	2.31	
Social expectations	7.48	1.99	7.41	2.17	7.53	1.96	7.42	1.89	
Negative beliefs	8.00	2.56	8.08	2.70	8.05	2.59	8.02	2.48	
Perceived risk	3.80	0.98	3.81	1.06	3.73	1.03	3.66	0.96	b>c, b>d
Number of weeks elapsed since ATI launch[1]	3.84	0.99	3.84	0.96	3.86	0.93	3.82	0.99	

Note: *Comparisons significant at the 0.05 level. [1]Variable logarithmically transformed.
Multiple comparison tests adjusted using the Bonferroni procedure to control for experimentwise error rates.

magnitude of loadings differed to a slight degree only in the third place to the right of the decimal point). These findings collectively suggest the latent construct of "Beliefs" had the same basic underlying psychometric structure in each of the validation samples.

Results of the Structural Equation Modeling

Figure 1 shows the results of the direct effects structural model depicting the influence of all the measures on a dichotomous measure of past 30-day marijuana use. The model includes the three observed campaign exposure measures, the latent factor of Beliefs, and intentions all specified as direct predictors of marijuana use. As depicted (for the calibration sample only), with the exception of exposure (= .014, *ns*) and specific recall (= –.019, *ns*), the remaining exogenous predictors were related significantly to marijuana use (general awareness: = .054, p .05; Beliefs: = –.373, p .001; and intentions: = –.374, p . 001). The direct effect model fit adequately, $^2(8) = 113.82$, p .001; CFI = .954, RMSEA = .065, Weighted Root Mean Square Residual (WRMSR) = .805 (the latter model fit statistic and weighted least squares estimation is used when modeling a dichotomous outcome). Table 2 contains the correlations among the exogenous measures (presented for the calibration sample only). Among the more sizable associations, exposure and recall were moderately associated (r = .30, p .001), as were awareness (brand) and recall (r = .46, p .001). The latent construct of "Beliefs" capturing the cognitive elements of perceived risks, normative perceptions, and social facilitation was moderately associated with intentions to not use marijuana (r = .75, p .001).

The direct effect model is an essential step in the modeling process to ascertain whether the exogenous measures can account for any variation in the endpoint (while statistically controlling for each other). The next step involved a re-specification of the direct effect model to reflect the theoretical processes outlined by TRA. This model posited awareness, specific recall, and exposure as exogenous predictors, and then included an a priori hypothesized chain of cognitive processes that predicts marijuana use. We first tested a fully saturated and unconstrained model with all possible effects (direct and indirect). While this model is not entirely theoretically consistent with TRA, it provides an initial test to detect any significant paths that may not have been hypothesized. By all indications, the fully saturated and unconstrained mediation model fit well, $^2(33) = 272.02$, p .0001, CFI = .973, SRMR = .05, RMSEA = .03, WRMR = 1.65. Careful inspection of the model parameters and z-critical test statistics indicated several paths were not significant (and were not theoretically consistent). These included all of the direct paths from recall and exposure measures to intentions, and likewise the direct paths from recall and exposure measures to marijuana use.

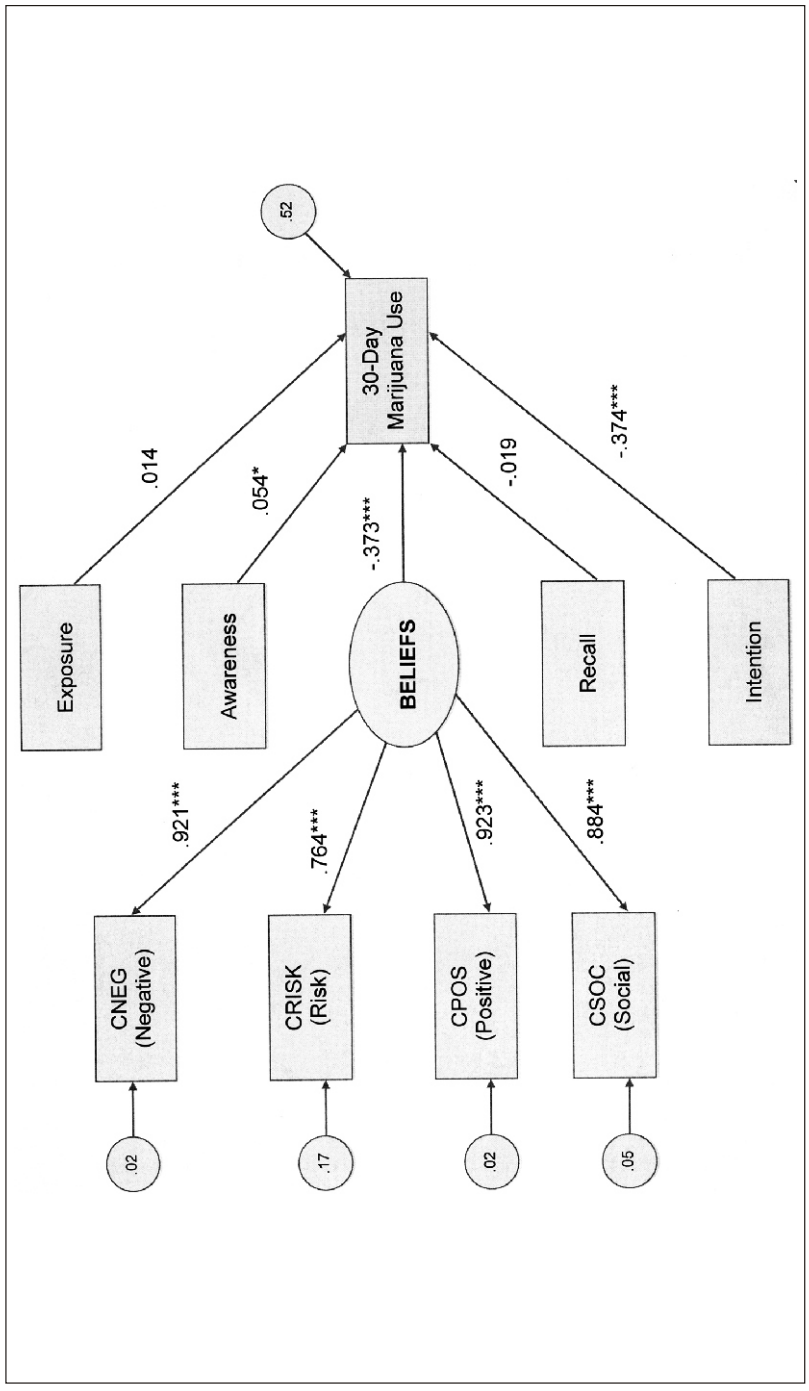

Figure 1. Direct effect model. *p .05, **p .01, ***p .001.

Table 2. Correlations among Exogenous Measures from "Constrained" Direct Effect Structural Model

	V1	V2	F1	V4	V5
Exposure (V1)	1.0	.07***	.00	.30***	.00
Awareness (V2)		1.0	.10***	.46***	.08***
Beliefs (F1)			1.0	.05**	.75***
Specific recall (V4)				1.0	04**
Intentions to use marijuana (V5)					1.0

*p .05, **p .01, ***p .001. Correlations are for "calibration" sample only.

The next step represented the theoretical model that comports with how the campaign is hypothesized to work. This included a meditational chain specifying effects of exposure and both brand awareness (general) and specific recall (recognition of logos and themes) on Beliefs, intentions, and marijuana use as well as effects of both beliefs and intentions on marijuana use. With these slight modifications, the model fit well, $^2(24) = 88.07$, p .001, CFI = .993, RMSEA = .03, WRMR = 1.771. The upper portion of Table 4 contains the parameters from the unconstrained model depicting the mediation chain and using all four random samples. The largest effects were associated with the paths from Beliefs to intentions, Beliefs to marijuana use, and intentions to marijuana use. Interestingly, the path linking awareness to marijuana use was small and positive and significant in two samples. This path suggests an "inconsistent" mediation effect (MacKinnon, Krull, & Lockwood, 2000). In these instances, the bivariate covariance between awareness and marijuana use is negative, but with successive variance partialling and potential suppression flips to a positive effect. The path from recall (remembering logos and anti-drug themes) to marijuana use was not significant in any case (one-tailed), albeit this path was negative indicating greater recall was associated with less past 30-day marijuana use. The path from exposure to marijuana use was positive and significant in two of the four samples.

The bottom half of Table 4 shows the results from the fully constrained model. In this model, all of the regression parameters were constrained to equality across all four random samples. The model fit indices indicated this constraint was reasonable, $^2(32) = 70.03$, p .0001, CFI = .996, RMSEA = .02. The nested difference test between the constrained and unconstrained model was not significant, $^2(14) = 6.58$, $p = .949$, thus we cannot reject the plausibility of the constrained model (i.e., the specified processes operate identically in the four samples). Table 4 also shows that for all four samples, and favoring campaign effects,

Table 3. Parameters from Unconstrained and Constrained Direct Effect Models

Sample	Awareness Use	Exposure Use	Recall Use	Belief Use	Intentions Use
Unconstrained direct effect model parameters					
Random-1	.054*	.014	–.019	–.374***	–.372***
Random-2	.031	.042*	–.016	–3.88***	–.352***
Random-3	.014	.066*	–.006	–.292***	–.425***
Random-4	.054*	.020	–.041*	–.346***	–.410***
Constrained direct effect model parameters					
Random-1	.040***	.035**	–.021*	–.358***	–.389***
Random-2	.039***	.035**	–.021*	–.353***	–.381***
Random-3	.039***	.035**	–.021*	–.349***	–.378***
Random-4	.039***	.035**	–.021*	–.357***	–.395***

*p .05, **p .01, ***p .001.

awareness was associated with more anti-drug beliefs. Likewise, having more anti-drug beliefs was significantly associated with fewer intentions to use marijuana. Consistent with the mediation chain, more anti-drug beliefs was associated with less recent marijuana use. Awareness had a small significant and positive association with marijuana use (in all four samples). The direct relation between recall and marijuana use was marginal ($p < .06$ one-tailed) in all four samples. As expected, intentions was negatively and significantly associated with marijuana use (less intentions to use associated with less marijuana use) in all four samples.

Figure 2 shows the final structural model trimmed of all the nonsignificant paths (parameters shown are based on the calibration sample). Across all four samples, the proportion of variance accounted for in the complete model was 49%, 47.6%, 46.6%, and 49.4%, respectively. Although not discussed at great length in terms of the four random samples, all of the associations among the exogenous measures were significant and positive (see Figure 2 for calibration sample results).

Decomposition of Effects

Assessing the significance of the full hypothesized mediation chain requires decomposition of the total direct and indirect effects. This provides a more explicit

Table 4. Parameters from Unconstrained and Constrained Mediation Models

Sample	Awareness Beliefs	Beliefs Intentions	Beliefs Use	Awareness Use	Recall Use	Exposure Use	Intentions Use
Unconstrained mediation model parameters							
Random-1	.098***	.766***	–.373***	.063**	–.033	.018	–.373***
Random-2	.104***	.764***	–.387***	.012	.000	.047*	–.351***
Random-3	.124***	.764***	–.293***	.029	–.025	.074*	–.425***
Random-4	.095***	.765***	–.346***	.050*	–.034	.030	–.410***
Constrained mediation model parameters							
Random-1	.103***	.766***	–.355***	.038**	–.022[m]	.042**	–.391***
Random-2	.107***	.769***	–.351***	.039**	–.022[m]	.042**	–.384***
Random-3	.106***	.766***	–.347***	.039***	–.023[m]	.043**	–.381***
Random-4	.102***	.755***	–.355***	.038**	–.022[m]	.042**	–.396***

*p .05, **p .01, ***p .001; m = marginal one-tailed ($p < .06$).

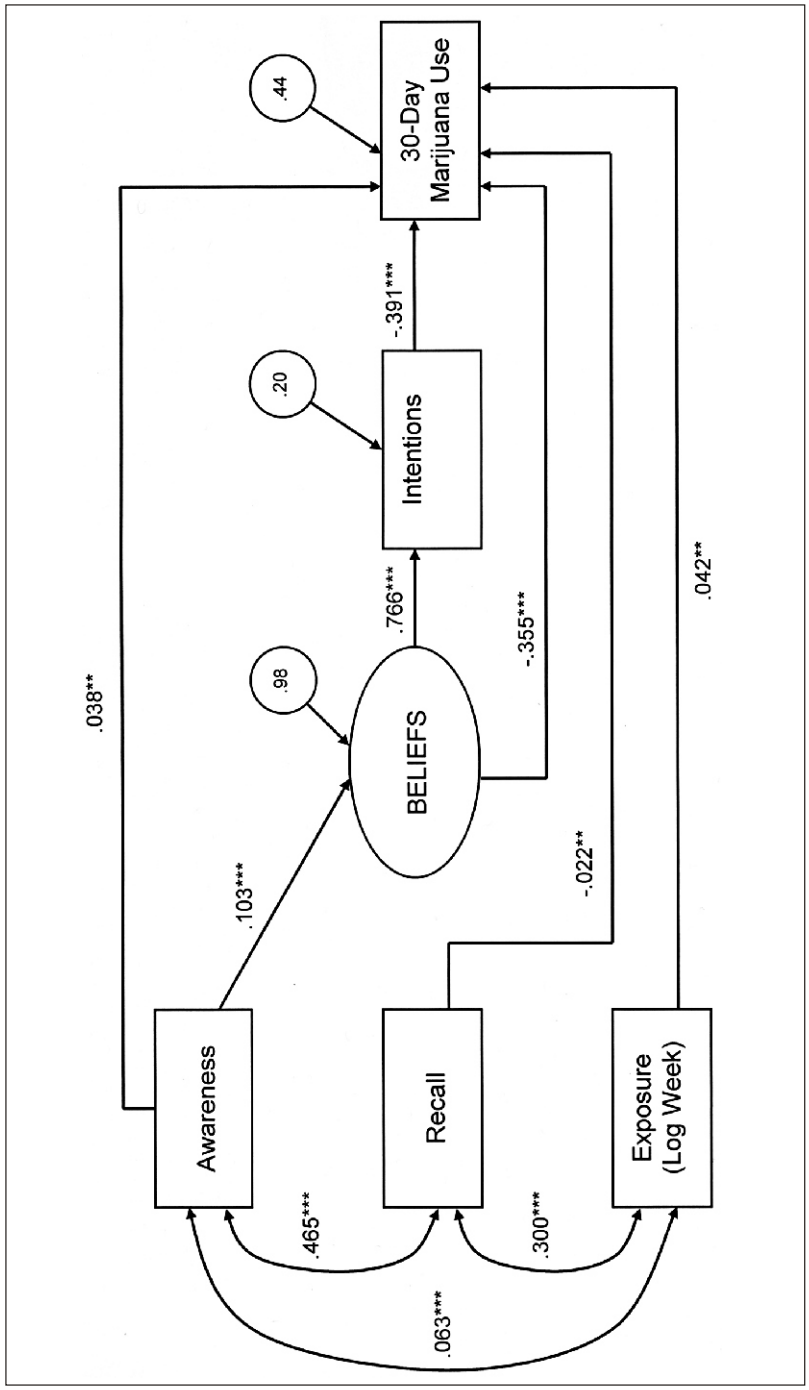

Figure 2. Final structural model, non-significant paths removed. *p .05, **p .01, ***p .001.

test of the campaign strategy and provides a clearer picture of how much of the effect on marijuana use from awareness is mediated through Beliefs and intentions. The sum of the indirect effect from awareness to marijuana use was significant (= –.031, SE = .003, z = 9.568, p .001), indicating that media campaign awareness was associated with more anti-drug beliefs and with fewer intentions to use marijuana and less actual consumption. Further decomposition showed the effect of awareness on consumption through Beliefs (not specifying intentions in the process) was significant (= –.029, SE = .003, z = 10.56, p .001) and so was the effect of awareness through Beliefs and intentions to marijuana use (= –.029, SE = .003, z = 11.07, p .001), the latter effect gaining some predictive variance because of the additional pathway through intentions.

After controlling for the indirect pathway, the overall direct effect of campaign awareness to marijuana use remains positive (= .035, SE = .008, z = 4.24, p .001). Controlling for campaign exposure, the remaining elements of the model including Beliefs, intentions, and marijuana use formed a perfect three-variable mediation chain and their statistical relations can also be decomposed. This analysis shows the total effect was significant (= –.532, SE = .007, z = 78.77, p . 001) and the sum of the indirect effect also was significant (= –.264, SE = .008, z = 31.11, p .001). This leaves the direct effect of Beliefs on marijuana use, which was significant as well (= –.269, SE = .012, z = 23.29, p .001). Computations also show that there is a large proportion of the total effect that is mediated (72%) through the specified cognitive chain. For the three-variable sequence involving Beliefs, intentions and marijuana use, 49.5% of the effect of Beliefs on use is mediated through intentions.

Multiple Group Models

Multiple group comparisons test the equivalence of models across age, gender, and race groups. In conjunction with the means analyses, these analyses provide additional information on the similarity of measurement and structural processes between the different groups. Following conventions for testing factorial invariance, we first examined the fit of the confirmatory factor model across subgroups (Byrne, Shavelson, & Muthen, 1989). This analysis tells us whether the latent factor Beliefs conveys the same meaning for the different subgroups. Following this step we constrained to equivalence the structural parameters from the final mediation model across the different demographic groups.

Turning first to age comparisons, the fit of the multiple group measurement model was adequate, $^2(18) = 880.94$, p .0001, CFI = .981, SRMR = .034, RMSEA = .108 and $^2/df = 48.9$. Modification indices suggested that a slightly improved model fit could be obtained by relaxing the constraint of equivalence for only one indicator across the three groups (perceived social consequences from using marijuana). The modification index (MI) was 14.09 for the younger age group (exceeding 3.84 for 1 *df*) and 22.25 for the older age group. After

freeing this parameter, the resultant loadings for perceived social consequences were $_{14}$ = .923, $_{15}$ = .915, and $_{16}$ = .899, respectively, and there was a significant improvement in model fit, $^2(2) = 24$, p .001. No further modifications were made given that with relatively large samples any trivial deviation for parameter values will net a significant p-value. The next step involved constraining to equality the structural (regression) parameters across age groups. This model fit well, $^2(92) = 1639.10$, p .0001, CFI = .974, SRMR = .027, RMSEA = .064 and $^2/df$ = 18. None of the MIs indicated any substantive changes to the model parameterization would improve the fit, suggesting that the prediction model worked equally well for the different age groups.

The CFA multiple group measurement model for gender fit well, $^2(10) = 794.22$, p .0001, CFI = .983, SRMR = .021, RMSEA = .113 and $^2/df$ = 79. Only one MI exceeded the critical threshold value (MI = 9.24) for perceived positive consequences of having anti-drug beliefs ($_M$ = .949, $_F$ = .935, respectively). Relaxing this constraint resulted in an improved model, $^2(1) = 9.22$, p .001. The multiple group structural model for gender fit well, $^2(57) = 1526.69$, p .0001, CFI = .975, SRMR = .021, RMSEA = .065 and $^2/df$ = 26.77. There were some slight differences in parameterization between male and female youth, but none that met the statistical criteria for relaxing an imposed constraint. For males, the effect of awareness on Beliefs was slightly larger $_M$ = .112 and $_F$ = .104, and all the other parameters were virtually identical in magnitude.

A multiple group measurement model for race (comparing whites versus all other race groups) indicated a good fit, $^2(10) = 846.18$, p .0001, CFI = .982, SRMR = .044, RMSEA = .117, and $^2/df$ = 84.6. The modification indices suggested that relaxing the loadings for perceived risk (MI = 31: $_W$ = .738 and $_O$ = .691, respectively for White vs. Other) and negative consequences (MI > 16: $_W$ = .923 and $_O$ = .927, respectively) would improve the model fit. The final model showed an improved fit, $^2(2) = 49$, p .001. Again, there is some slight difference in the magnitude of the loadings but nothing to indicate the latent factor of Beliefs behaves differently for the different race groups. The multiple group structural model for race fit well, $^2(57) = 1624.47$, p .0001, CFI = .974, SRMR = .035, RMSEA = .067, and $^2/df$ = 28.49. Several MIs indicated relaxing constrained parameters would improve the overall model fit. In particular, we relaxed the parameter corresponding to the effect of Beliefs on intentions ($_O$ = .701 and $_W$ = .764), general awareness on both marijuana use ($_O$ = –.009, p > .05 and $_W$ = .056) and Beliefs ($_O$ = .158 and $_W$ = .086). With these changes, the model fit improved, $^2(3) = 70$, p .001.

DISCUSSION

This study yields new insight into the effectiveness of the national youth anti-drug media campaign, providing a fresh angle in the evaluation process. The

analyses emphasized three different ways youth can recognize the campaign ads including "brand" awareness, recall of specific campaign ads, and a more general measure capturing an individual's overall exposure duration. Data for the study involved youth ages 14 to 16 that participated in mall intercepts conducted across the United States. This target age period coincides with the time when many youth initiate to drug use and represents a period of heightened vulnerability to their peer influences and risk behaviors. There is tremendous cost economy to collecting mall intercept data and this helps evaluators keep a finger on the pulse of the campaign, providing readily accessible information on whether the messages are tractable and working in the manner hypothesized.

Several different pieces from the evaluation are worth noting, including evidence of positive campaign effects, the differential magnitude of effects, their consistency across multiple samples, and congruence with the posited theoretical model. Beginning with the first model tested, we hypothesized a latent construct of "Beliefs" capturing youths' perception of the harm from marijuana use, positive or enhancing effects, and its perceived social acceptability. These items represent different facets of what TRA suggests captures the "evaluative" or deliberative process many youth engage as they consider whether it is worth using drugs to gain social acceptance or credibility in their peer group. The psychometric soundness of this construct indicates that youth "bundle" their cognitions regarding perceived acceptability, risks, and consequences associated with using drugs. This bodes well for the campaign because it suggests that efforts to modify beliefs may be fruitful given they are accessible to self-report and may work synchronously.

Overall, the direct effect model suggests the measures chosen to reflect campaign awareness relate in the manner hypothesized to the target outcome, with the exception of brand awareness, which had a small positive association. Even though this effect was positive and therefore counterintuitive, it most likely reflected suppression (a reversal of signs from the zero-order relations) in the model.[2] The remaining relations were consistent with campaign themes and reinforced the value of the various components of TRA in predicting behavior. When the direct effect model was reconfigured to be theoretically consistent

[2]There is some evidence of suppression in the various effects on marijuana use. For instance, the negative effect from specific recall to marijuana use is significant only one-tailed using the *z*-critical ratio of the unstandardized regression coefficient divided by its standard errors. If this effect is removed, the effect of exposure on marijuana use is positive and significant. However, if the effect of exposure is removed (constrained to zero), the effect of recall is not significant. Likewise, constraining the effect of awareness on marijuana use to zero also renders the effect of recall non-significant. Despite the transitive nature of these effects, we kept them intact because recall and awareness capture uniquely different facets of brand and advertising awareness and both are uniquely different from the measure of exposure, which captures the element of time and dose.

with a value expectancy model it showed that the effect of awareness was primarily meted through drug-related beliefs. Campaign awareness set the stage for protection by stimulating anti-drug beliefs, fewer intentions to use drugs, and less consumption of marijuana. This finding is consistent with those produced by the PDFA in earlier iterations of the campaign; findings which showed that remembering campaign themes was associated with decreased probability of marijuana use (Black et al., 2002).

The SEM captures only a snapshot of a limited set of cognitive elements hypothesized to influence youth drug use, but it reveals that these influences carry substantial weight. In essence, the size of the regression coefficients indicates that even a small association between awareness and cognitive belief structures is associated with a much larger impact on drug use. This observation should factor heavily into the conceptualization of any media campaign with health implications. If you want to change behavior, then you have to choose malleable precursors to the behavior. In the present context these include beliefs about the risks and damaging consequences of marijuana use. Any changes in consumption patterns would appear to be best guided by changing youth's beliefs about the effects of drugs, their utility, and the sanctions imposed by referent groups regarding their normative value or social acceptability. The relatively large association between these youths' beliefs and their drug use intentions also reinforces that once a cognitive expectation of effects from using marijuana is set into motion, it becomes linked with their willingness to use marijuana. Even more important, even though "*intention*" captured future willingness to use marijuana, there was still a close correspondence between intention and behavior regardless of the different time frames. This finding is in keeping with the predictions made from TRA that behavior specific intentions will correlate highly with behavior when there is close temporal proximity.

In contrast to the expected sequence proposed by TRA, beliefs also had a direct and negative association with behavior (bypassing intentions). Even in light of how TRA posits effects on behavior, we also noted that different measures of campaign recollection and brand awareness had small but significant direct effects on marijuana use. While both paths were positive, inferring "iatrogenic" effects, these relations appear to be statistical artifacts resulting from confounding or suppression. Other than social diffusion and heightened awareness, there is no theoretically consistent reason for a direct (and positive) effect. It is possible marijuana users report more awareness of campaign advertising because they are more likely to attend to advertising on a topic already "on their radar screen"—just like someone thinking of buying a car is more likely to notice an automobile advertisement compared to a more disinterested party.

We also posited a mediation sequence specifying that campaign exposure influences belief structures. The total spectrum of findings reinforces that this theoretical model is necessary but not "sufficient" to account for behavior and that other explanatory mechanisms, omitted from the model, are required to account

for behavior. We did not specify elements from any other models, including refinements to the TRA, that involve the role of perceived self-efficacy. This leaves a residual portion of variance in the outcome that might be apportioned to these measures and that are for now captured by the direct effect of awareness. Theoretically informed models with a wider set of predictors might partial this residual portion of variance removing any specter of iatrogenic effects.

Comparative Drug Use Rates

It is also worth asking whether youth participating in mall intercepts are representative of the larger body of youth that provide nationally representative estimates of drug use trends. To accomplish this we compared the 30-day prevalence estimates from the mall sample to the Monitoring the Futures (MTF) (Johnston, O'Malley, Bachman, & Schulenberg, 2007) and National Survey on Drug Use and Health (NSDUH) estimates (Substance Abuse Mental Health Services Administration, 2007). The numbers from the MTF for the corresponding age group (10th grade) indicate that 14% reported past 30-day marijuana use for the year 2006 and the number from the NSDUH indicate that 10.3% (14 years of age), 21% (15 years of age), and 29% (16 years of age) reported ever use. The mall intercept estimate is considerably higher than these other drug surveillance indicators. The lack of precision and direct correspondence may arise from the different methodologies and participant recruitment strategies used (Fendrich & Johnson, 2001). The mall intercept used touch-screen computers in a market research facility located inside malls, whereas the MTF data is obtained using paper-and-pencil questionnaires administered in classroom settings and the NSDUH utilizes in-home computer-assisted interviews. The mall techniques do not have parental or adult supervision, whereas the other approaches might possibly induce some hesitance in youth feeling their behavior could be exposed.

Multiple Group Models

The information obtained from the multiple group models allowed us to assess whether TRA is a useful explanatory framework for the different age, race, and gender groups. Interestingly, loadings for the measure of perceived social consequences of using marijuana varied considerably between demographic groups. This is perhaps indicative of the different relative strength of perceptions youth obtain from their vicarious or direct experiences surrounding drug use. Since youth are likely to mirror certain behavioral beliefs regarding drugs based on their closest friends, it is not surprising that differences crop up based on age, gender, or race group. We also found some evidence suggesting that structural differences exist between demographic groups. For example, the association between brand recognition and anti-drug beliefs was much stronger

for racial minority youth. One caution with the multiple group analyses is the sample size is quite large, and any trivial deviations may reflect statistical artifact more than any practical significance. Still these differences are worth exploring further to determine whether receptivity of the campaign messages is equivalent across meaningful subgroups that may interpret messages differently.

Future Considerations

The ATI campaign was analyzed as a "*stand alone*" advertising campaign without redress to any supplemental activities. Flay (1987, 2000) suggests that ad campaigns should be wedded to community and school-based programs to obtain maximal effectiveness for social psychological based programs. Indeed, there have been favorable findings from campaigns blending both community-based media awareness and school efforts (Slater, Kelly, Edwards, Thurman, Plested, Keefe, et al., 2006). More recently, Slater and colleagues contrasted program evaluation findings from the "Be Under Your Own Influence" campaign, combining community-based media efforts with a school component versus the ONDCP media campaign and did not find significant school-level effects (Slater, Kelly, Lawrence, Stanley, & Comello, 2011). In contrast, Longshore and his colleagues found that the impact of a school-based prevention program was magnified among students that also reported awareness of campaign advertising (Longshore et al., 2006). Perhaps media campaigns such as ATI can serve as boosters to ongoing school-based prevention efforts, reinforce the stated message, and increase the "reach" to wayward youth that are not exposed to an evidence-based drug education program conducted in school (Ringwalt, Vincus, Hanley, Ennett, Bowling, & Rohrbach, 2009). The net benefit of the media campaign is that it does contribute in some fashion or manner to the already existing panoply of messages deterring youth from drug use.

General Study Limitations

Even with the strengths supporting this study there are a number of limitations worth noting. The data reported in this study are cross-sectional and limit the chance to explore trends in consumption or exposure. Thus, care must be taken to address "*effects*" as mere contemporaneous associations, although they can still paint a vivid picture of theoretically consistent relations. In addition, the decision to create random cross-validation samples may result in some loss of precision in parameter estimation. The sample is considerably large and has excessive power; therefore, cross-validation seemed an optimal strategy to avoid making statistically significant findings appear practically meaningful.

Moreover, we did not control for possible confounders and measures that may spuriously cause the association between the different types of exposure, recall, and marijuana use. Risk taking is one such measure that is known to relate to

drug use and characterize vulnerable youth. Work along these lines has shown that campaign messages are dependent on an individual's willingness to engage in risky behaviors (Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001; Palmgreen et al., 2007). Consistent with the small size of the models tested, future research should examine a wider range of etiological factors such as propensity toward sensation-seeking that can influence drug use and at the same time alter youths' receptivity to prevention messages. No matter, the linkages between cognitions and behavior fit the proposed TRA framework and show that mass media campaigns are appropriate deterrents for youthful drug use.

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Direct reprint requests to:

Lawrence M. Scheier
LARS Research Institute, Inc.
11735 Glowing Sunset Lane
Las Vegas, NV 89135-6124
e-mail: scheier@cox.net – or – www.larsri.org