

Antismoking Initiatives: Effects of Analysis Versus Production Media Literacy Interventions on Smoking-Related Attitude, Norm, and Behavioral Intention

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This study developed inoculation-driven antismoking interventions aimed at changing attitudes, norms and intentions about smoking to influence smoking behavior in adolescents. This study explored the efficacy of 2 intervention approaches designed to help adolescents to refrain from smoking initiation. Participants were junior high students (6th, 7th, and 8th grade) from schools in the Northeast. Two kinds of experimental workshops and a control group were designed as stimulus material in a repeated measure nonequivalent group experimental design. The 2 intervention workshops developed included: analysis + analysis (where participants discussed and analyzed cigarette and antismoking ads) and analysis + production (where participants discussed, analyzed, and then created their own antismoking ads). The analysis + production workshop was generally more successful than the analysis + analysis workshop and control group in changing participants' behavioral intention to smoke and attitude toward smoking but not subjective norms over time. Implications and directions for future research are discussed.

Cigarette smoking remains the leading cause of preventable morbidity and mortality in the United States among all ethnic groups ("Annual Smoking-Attributable Mortality," 2002). According to the Youth Risk Behavior Surveillance System in 2001, 28.5% adolescents in Grades 9 to 12 were current smokers (those who had smoked on 1 or more of the preceding 30 days) (Grunbaum et al., 2002). Over 80% of tobacco use initiation occurs among adolescents less than 18 years of age (Centers for Disease Control, 1994) and smoking initiation accelerates during the 13–15 year age-interval (King & Coles, 1992).

When smoking is initiated at a young age, the risk of heavy smoking increases (e.g., Escobedo, Marcus,

Hotzman, & Giovino, 1993; Taioli & Wynder, 1991) and nicotine dependence increases (McNeill, West, Jarvis, Jackson, & Bryant, 1986). In addition, the early onset of cigarette smoking renders smoking cessation more difficult (e.g., Khuder, Dayal, & Mutig, 1999; Prokhorov et al., 2001). Even within their first year of smoking cigarettes, young adolescents report adverse effects when they attempt to quit (McNeill et al., 1986). Delaying the initiation of smoking may have significant public health benefits (Rohde, Lewinsohn, Brown, Gau, & Kahler, 2003), which emphasizes the need for interventions aimed at interrupting smoking initiation and behavior before dependence sets in (McNeill, 1991). However, it is not clear which type of preventive effort and target will be most cost and time effective. The theory of reasoned action (TRA) provides a framework and description of variables that can be targeted to reduce smoking initiation in young adolescents.

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THE THEORY OF REASONED ACTION (TRA)

The central proposition of the TRA is that people's behavioral decisions are based on their careful and detailed analysis of the available information in making a reasoned choice (Fishbein & Ajzen, 1975). According to the TRA, the immediate precursor of any given behavior is a person's intention to perform that behavior, so-called behavioral intention. The determinants of people's behavioral intentions are people's attitudes toward performing the given behavior (*attitude*), and the perceived normative pressure to perform that behavior (*subjective norm*). In the context of smoking behavior, any intervention designed to change prosmoking attitude and/or subjective norm should then also result in changes in smoking intention, pointing to key measures/outcomes as targets of campaigns. The TRA clarifies what cognitive components to change, yet it does not provide an explanation of why or how the interventions change attitude and/or behavior (see Ajzen & Fishbein, 1980; Hale, Householder, & Greene, 2002). Inoculation theory provides a deeper understanding of the mechanism behind such persuasion processes (especially resistance).

INOCULATION THEORY

Inoculation theory describes the processes by which an existing attitude such as antismoking can be made resistant to change. According to O'Keefe (2002),

It is very well to persuade someone to one's point of view – but once persuaded, the person may be exposed to counterpersuasion, that is, persuasive messages advocating some opposing viewpoint. The question that naturally arises is how receivers might be made resistant to such persuasive efforts. (p. 246)

Inoculation theory (McGuire, 1964) focuses on the processes used to make people more resistant to persuasion. According to this theory, ability to resist persuasion is determined by the individual's skill at refuting arguments that are against his/her beliefs (Farkas & Anderson, 1976).

Application of Inoculation Theory to Smoking Prevention

Young children often have very negative attitudes toward smoking (see Pfau, 1995; Porcellato, Dugdill, Springett, & Sanderson, 1999). The transition from primary to middle school often causes a deterioration of such attitudes, leading to experimentation with smoking, regular smoking, and tolerance of smoking by peers (e.g., Gritz et al., 1998; Pfau, Van Bockern, & Kang, 1992). This transition period creates an indifference to health consequences of smoking among

adolescents (Rokeach, 1987) and makes them more vulnerable to the influence of peer pressure to smoke (Friedman, Lichtenstein, & Biglan, 1985; Gottlieb & Baker, 1986).

Inoculation theory provides a valuable approach to smoking prevention at this stage because adolescents often have prior established attitudes opposing smoking. "What is needed at this point is a strategy to protect these anti-smoking attitudes from deteriorating during the turbulent middle school years" (Pfau, 1995, p. 104). To design a message for refuting antismoking attitudes, two kinds of messages are needed: a set of initial inoculation messages and follow-up reinforcing material. The initial inoculation messages require two components: threat plus refutational preemption (Pfau, 1995). The threat can consist of realistic situations that cause adolescents to experience anxiety about the future stability of their current antismoking attitudes. For instance, "three out of four students experiment with smoking in junior high school." The refutational preemption consists of arguments against the current attitudes and could include common counterarguments in favor of smoking such as "smoking is cool," or "smoking is harmless". The next step is exposing the receiver to follow-up reinforcing material that addresses counterarguments, for instance, "Some people who smoke think they look cool. But if you get close, all you smell is bad breath, yellow teeth, and stinky clothes and hair."

In comparison with outdated interventions such as simple education about the risks of smoking or teenage pregnancy, research has documented that attitude inoculation frequently reduces risky behaviors by 30% to 70% (see Hershey et al., 2005; Perry, Killen, Slinkard, & McAlister, 1980). In Perry et al.'s study, high school students inoculated junior high schools students against smoking by having the younger kids role-play the kind of real-life situations they might actually face with a peer who pressured them to try a cigarette. The students who were inoculated in this manner were about half as likely to become smokers compared with students in a very similar school who did not receive this intervention (see Perry et al., 1980).

From the preceding discussion, it follows that inoculation is a possible strategy for smoking prevention efforts targeting adolescents, particularly because young adolescents possess attitudes against smoking that are under pressure (Pfau, 1995). A health prevention approach that can be used under the framework of inoculation theory is media literacy.

MEDIA LITERACY AS A STRATEGY FOR ANTISMOKING INTERVENTIONS

Many messages about health (specifically about smoking) are portrayed in media (for review see Wakefield, Flay, Nichter, & Giovino, 2003). Media literacy implies an understanding of both content and form of many different media

(Geertz, 1983; Heath, 1983). For instance, one aim of media literacy programs is to increase students' awareness of the forms of media messages they encounter daily. From this perspective, consumers should be able to comprehend, analyze, evaluate, and make reasoned choices about advertising jingles, public service videos, and news reports (Quesada, Miller, & Armstrong, 2000).

Media literacy intervention has the potential of empowering participants, particularly in the arena of public health (see Bergsma, 2004), for example, through providing opportunities for experiential learning by inoculating participants against prosmoking attitudes. Experiential learning can be described as a "direct encounter with the phenomena being studied rather than merely thinking about the encounter, or only considering the possibility of doing something about it" (Borzak, 1981, p. 9). The success of the American Legacy Foundation's *Truth Campaign*, which used adolescents to address some misleading tactics of the tobacco industry, can be seen as an example of experiential learning (see Bergsma, 2004). Media literacy can be used as an application of experiential learning that uses activities (see Beard & Wilson, 2004), yet evaluations of media literacy programs for youth, particularly in the context of health, are sparse (see Gonzales, Glik, Davoudi, & Ang, 2004). In spite of a nationwide call to integrate media literacy approaches with school-based tobacco prevention programs (Media Literacy Drug Prevention Teacher Survey Report, 2002), published examples of research are limited (Beltramini & Bridge, 2001). This study provides some such evaluation research.

Different Strategies for Media Literacy Interventions

The backbone of media literacy education involves learning technical skills to decode the meaning behind the media and developing a critical understanding of the relationship between the different message content (Davies, 1996). Two different kinds of media literacy workshop strategies have been designed and evaluated (to a limited extent) by researchers—one focusing on analysis of media messages and the other on production of media messages. These analyses and production components are the two key components of media literacy curriculum (see Aspen Institute Leadership Forum, 1992). Traditionally, health messages designed to confer resistance to both same and novel counterarguments have been supplied to individuals in forms of public service announcements, peer and adult spokespersons, videos, etc. (e.g., Luepker, Johnson, Murray, & Pechacek, 1983; Pfau et al., 1992). Media literacy can be used as a novel experiential learning strategy for conferring resistance to individuals by getting them engaged in analysis or production of refutational arguments. This modified form of self-persuasion can be expected to strengthen individuals' resistance to counterpersuasion.

Analysis media literacy interventions. According to (Zettl 1998), "anything that has as much influence on our

individual and societal development and behavior as the mass media needs to be carefully analyzed and examined" (p. 83). Media literacy training based on analysis will focus on critiquing and examining media messages. (Masterman 2001) stresses the significance of making the textual investigation of any medium more systematic and rigorous by understanding the key concepts, which include denotation and connotation, genre, selection, narrative structure, sources, and encoding/decoding. (McBrien 1999) asserts that a student who is safest from objectionable media messages is one who is literate about media and can assess and evaluate messages. This analysis approach to media education allows students to critically examine media messages by describing "what's going on" in detail.

Production media literacy interventions. Another kind of media literacy program focuses on students' understanding and application of the production process of television (or any other media form), including lighting, camera angles, and sound, in creating their own media message (FisherKeller, 2000; Mudore, 2000; Zettl, 1998). This kind of information provides participants with an understanding of how media messages are constructed and how interactions among various production techniques produce specific effects. The production approach of media literacy, however, encompasses some analysis processes, too. According to Kubey (2000), providing opportunities for children to create their own media stories, documentaries, or news can help students understand the entire process of media production. In addition, students learn best by doing and getting hands-on experience (Kubey, 2000). Rich (2004) describes, "As literacy is not just reading but writing language, media literacy is not just critical media consumption but media creation" (p. 165). Tyner (1992) cautions production-centered media educators to beware that the excitement of creating media products does not lead to a lack of critical understanding of the media message. Nevertheless, the production approach to media literacy is highly student-centered and is often credited for increasing student self-esteem by engaging students and providing opportunities for self-expression (Tyner, 1992). Because the students are themselves involved in creating media messages, this strategy is called the "production" module of media literacy.

Comparing analysis and production. The two strategies of media literacy training have both been utilized in creation of media literacy curricula (see Bergsma & Ingram, 2001; FisherKeller, 2000; McBrien, 1999; Pinkleton, Austin, Cohen, & Miller, 2003; Zettl, 1998). However, there are limitations and unaddressed issues with these programs (see Bergsma & Ingram, 2001; Pinkleton et al., 2003). First, antismoking programs (especially, media literacy) employ a variety of strategies to prevent adolescent cigarette use. The five or six lessons incorporated in the curriculum engage the students in analyzing, critiquing,

and producing media messages. It can be argued then, that the results show an additive effect of receiving the same antismoking message over time that causes a temporary shift in attitudes. Because the interventions incur cost (time and money), it is important to understand what kinds and dosages of strategies/programs are most efficacious.

Second, most antismoking campaigns (e.g., Siegel & Biener, 2002; Sly, Hopkins, Trapido, & Ray, 2001; Worden & Flynn, 2002) involve their target group by exposing them to powerful, persuasive, provocative, and thought-provoking antismoking messages. Much formative research underlies such antismoking messages, but adolescent responses to such messages may be very different from those of adolescents who are actively involved in generating such messages. For instance, most of the tobacco prevention efforts are designed to involve adolescents in different kinds of activities aimed at changing norms, beliefs, and/or expectations (e.g., Beltramini & Bridge, 2001; Paavola, Vartiainen, & Puska, 2001; Worden & Flynn, 2002). Instead of involving adolescents in antismoking activities, adolescent participation in creation of antismoking messages provides insight into the persuasion process. In such cases, target audiences will not just be passive recipients of messages but active participants who will generate messages themselves.

This study addresses the aforementioned issues by: (a) examining which of the two prominent media literacy strategies (analysis + analysis or analysis + production) is more effective in changing smoking-related attitude, norm, and behavioral intention and (b) involving participants in analysis and creation of antismoking messages and evaluating the efficacy of analysis versus production strategies. Because this study focused on evaluating the best approach to inoculating adolescents against smoking, it was necessary to understand and evaluate the two approaches (analysis vs. production) in the context of smoking. It is expected that participatory production in the form of engaging students in creating their own media message will be more effective than participatory discussion (or analysis) which has the "action" component missing (see Kolb, 1984). Based on the foregoing discussion and use of TRA to frame outcome variables, we hypothesized:

H1: The analysis + production approach will be more effective in changing smoking-related attitude,

norm, and behavioral intention than the analysis + analysis approach.

METHOD

Participants and Procedure

Two hundred and sixty ($N = 260$) male ($n = 104$) and female ($n = 156$) students enrolled in 6th to 8th grades in two Northeastern schools were recruited for the study.¹ The students ranged in age from 11 to 16 ($M = 12.49$, $SD = 1.06$). The sample was predominantly Hispanic (74%) and African American (13%; other groups $\leq 3\%$ each).

The study was a nonequivalent control group experimental design with measures at four times. The design included random assignment of classrooms (not students) to the different experimental conditions. Classes (6th, 7th, and 8th grades in two schools) were randomly assigned to experimental group 1 (A + A workshops, analysis), experimental group 2 (A + P workshops, production), or a control group (see Table 1 for a description of the design). Students filled out surveys and participated in workshops during regular class time, with active parental consent.

Measurement Instruments

Variables measured included behavioral intention to smoke, attitude toward smoking, and subjective norm as part of a larger project on adolescent risk taking.²

Behavioral intention to smoke. Behavioral intention to smoke was assessed using three items constructed by the authors. Responses for the items were rated on a 5-point scale ranging from 1 (*quite unlikely*) to 5 (*quite likely*): "How likely are you to smoke?"; "How likely are you to smoke occasionally at parties?"; and "How likely are you to stay away from smoking?" The factor analysis yielded a one-factor solution (eigenvalue = 2.06, 68.74% variance

¹There were no differences between schools on measures of interest for this study, so they were combined for this study. One class of students ($n = 25$) participated in a third workshop type (production + production). However, analyses are not reported for this group because of sample size and nonsignificant results for behavioral intention, attitude toward smoking, and subjective norm across the four times.

²All measures were created by the authors and pretested with subsamples of 110 undergraduate students enrolled in communication classes.

TABLE 1
Design of the Experiment

Group	Time 1 (Week 1)	Time 2 (Week 2)	Time 3 (Week 3)	Time 4 (Week 5)
A + A ^a	Pretest (40 min)	Analysis I (40 min) + Intermediate test (15 min)	Analysis II (40 min) + Posttest I (15 min)	Delayed posttest (40 min)
A + P ^b	Pretest (40 min)	Analysis I (40 min) + Intermediate test (15 min)	Production (40 min) + Posttest I (15 min)	Delayed posttest (40 min)
Control ^c	Pretest (40 min)			Delayed posttest (40 min)

Note. A + A = Analysis + Analysis; A + P = Analysis + Production. ^aFive classes; $n = 84$. ^bFive classes; $n = 94$. ^cThree classes; $n = 57$.

explained) with all items loading greater than .6 on the factor. Reliability was moderate (Cronbach's $\alpha = .75$), and all item total correlations were greater than .4 on this scale. These three items summed and averaged to form a composite scale with a higher score indicating more behavioral intention to smoke ($M = 1.90$, $SD = 1.01$).

Attitude toward smoking. In the proposed study, attitude toward smoking was measured as evaluation of behavioral beliefs but not belief strength (see O'Keefe, 2002) and contained three Likert-type items. Responses for the items were rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*): "I believe smoking is bad"; "I believe smoking occasionally at parties is bad"; and "I believe staying away from smoking is good." Reliability (Cronbach's alpha) was .58 at Time 1 (.85 at Time 4), and factor analysis yielded a one-factor solution (eigenvalue = 1.68, 55.85% of variance) with all items loading greater than .6. These three items were summed and averaged to form a composite scale with a higher score indicating more positive attitude toward smoking ($M = 1.55$, $SD = .65$).³

Subjective norm. Subjective norm was calculated as a function of two components: (a) normative beliefs of others and (b) motivation to comply.⁴ The measure of normative beliefs of others was developed by the authors to be specific to the context of adolescent smoking behavior and contained nine Likert-items. Responses for the items were rated on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*): "My parent(s) think smoking is bad"; "My parent(s) think smoking occasionally at parties is bad"; and "My parent(s) think staying away from smoking is good." These three items were repeated, changing the target from parent(s) first to friends, then to best friend. The measure of motivation to comply consisted of three items rated on a 5-point scale with responses ranging from 1 (*strongly disagree*) to 5 (*strongly*

agree): "When it comes to cigarette smoking, I want to do what my parent(s) think I should do" (also changed parents to friends and best friend). To create a score for subjective norm, three product variables were created. Reliability (Cronbach's alpha) was .66, and factor analysis yielded a one-factor solution (eigenvalue = 1.81, 60.30% of variance) with all items loading greater than .5. These three scores were summed and averaged to form a composite scale with a higher score indicating more accepting subjective norm for smoking ($M = 4.85$, $SD = 2.50$; also see note 3).

Stimulus Materials and Manipulations

The workshop manipulation varied the processes involved in teaching smoking-related health workshops, keeping the source and teaching environment the same.⁵ The workshop manipulated analysis of cigarette advertisements versus production of counter cigarette advertisements (the control group did not receive workshops). The workshops varied the approach used for delivering follow-up reinforcing material to inoculate students against smoking initiation (see Pfau, 1995). The Analysis I workshop (given to both workshop groups) introduced students to threat and refutational preemption by exposing them to tobacco advertising using different persuasion techniques and helping students unravel the arguments absent from cigarette advertisements. The Analysis II workshop provided students with follow-up reinforcing material to counter the messages provided by cigarette advertising (see Pfau, 1995). The students were involved in analysis of antismoking print ads to understand the arguments used in antismoking ads and explore the differences in smoking ads versus anti-smoking ads. The smoking message Production workshop provided students with follow-up reinforcing material to counter the messages provided by cigarette advertising (see Pfau, 1995). These students were involved in production of smoking-related messages illustrating arguments missing from cigarette advertisements.

RESULTS

Analyses

Analyses for H1 included testing for both between- and within-subject differences.⁶

³Descriptive statistics run to explore normality of the attitude toward smoking scale showed a skewed distribution for attitude toward smoking scale (skewness = 1.11, kurtosis = .51). This scale was transformed using frequency distribution so that the intuitive interpretation of the attitude toward smoking scale (with a higher score indicating a more positive attitude toward smoking) was maintained while the scale showed a normal distribution. Descriptive statistics run to explore normality of the normative beliefs of parents, friends, and best friend scales showed a normal distribution for normative beliefs of friends scale (skewness = .62, kurtosis = -.09), but skewed distributions for normative beliefs of parents scale (skewness = 2.39, kurtosis = 6.80) and normative beliefs of best friend scale (skewness = 1.50, kurtosis = 1.94). Applying transformation to normative beliefs of parents and best friend scales reduced skewness. The behavioral intention scale was normally distributed and not transformed.

⁴Although belief strength was not used in the creation of the measure of smoking beliefs, motivation to comply was used in the creation of the measure of subjective norm. Belief strength does not significantly improve the prediction of attitude when a standardized set of beliefs is used (Cronen & Conville, 1975; Delia, Crockett, Press, & O'Keefe, 1975). As a construct, motivation to comply does significantly improve the prediction of subjective norm when the items focus on the specific behavior of interest (O'Keefe, 2002).

⁵Details of the workshops are available from the authors upon request. All sessions were conducted by the same trained researcher (with a classroom teacher present but not participating) using a pretested script for each condition.

⁶Steps involved in between-subject analyses: Step 1: To show that groups are equal on outcomes at baseline; Step 2: To show that groups are different on outcomes postintervention; Step 3: To show that outcomes should change the same following the Analysis I workshop; Step 4: To show that the Production and Analysis II workshops generated different changes on outcomes. Steps involved in within-subject analyses: Step 1:

Results for Behavioral Intention to Smoke

Between-subject comparisons. To examine the effectiveness of workshop type on change in behavioral intention to smoke, one-way analyses of variance (ANOVAs) were first conducted to examine the difference between A + A workshops, A + P workshops, and control group from Times 1 through 4. Differences between A + A, A + P, and the control groups on behavioral intention to smoke by Time showed that the only significant difference between the three groups was on behavioral intention to smoke at Time 4, $F(2, 232) = 4.04, p < .05$ (see Table 2). Follow-up t tests conducted for behavioral intention to smoke at Time 4 revealed that at Time 4 the control group reported higher intention to smoke than the A + A or A + P groups (recall that a higher score for behavioral intention to smoke indicates a stronger intention to smoke). Thus, behavioral intention to smoke at Time 1 was equal across groups at baseline (Time 1), and Times 2 and 3, but unequal at Time 4 (Steps 1, 2, and 3 confirmed. Step 4 not confirmed).

Within-subject comparisons. A repeated measure multivariate analysis of variance (MANOVA) was used to assess the overall change in behavioral intention to smoke from Time 1 through Time 4 (separately for A + A, A + P, and control groups).⁷ The results for the repeated measure MANOVA for control group indicated that the main effect for the within-subject variable (Time), Wilks's $\Lambda = .99, F(1, 54) = .37, p = .54, \eta^2 = .01$, was not significant (Step 1 confirmed). The results for the repeated measure MANOVA for the A + A workshop indicated that the main effect for the within-subject variable (Time), Wilks's $\Lambda = .73, F(3, 77) = 9.74, p \leq .001, \eta^2 = .28$, was significant (Step 2 confirmed). The results for the repeated measure MANOVA for the A + P workshop indicated that the main effect for the within-subject variable (Time), Wilks's $\Lambda = .80, F(3, 81) = 6.90, p \leq .001, \eta^2 = .20$ was significant (Step 3 confirmed).

To examine the difference over time in behavioral intention to smoke scores for participants in the A + A versus the A + P workshops, six pairwise comparisons were conducted (separately for each workshop type). The results showed

that for the A + A workshop, the mean for behavioral intention to smoke was highest at Time 1 as compared to Times 2, 3, and 4. In addition, the results also show that the Analysis II workshop did not bring about an added significant reduction in intention to smoke (because intention to smoke did not differ significantly between Times 2–3). For the A + P workshop, the results showed that the mean for behavioral intention to smoke was highest at Time 1 and was significantly lower for Times 3 and 4. The Analysis I session was not successful in reducing intention to smoke (because intention to smoke did not differ significantly between Time 1 and Time 2). In addition, behavioral intention to smoke was significantly lower for Times 3 and 4 (compared to Time 2). Therefore, the Production session was successful in reducing intention to smoke from Time 2, and this reduction in intention to smoke was evident at delayed posttest (Time 4) as well.

Summary for behavioral intention. The between-subject analyses showed that behavioral intention to smoke was significantly higher for the control group compared with A + A and A + P workshops (particularly at Time 4). The within-subject analyses revealed that the Production session was more successful than both Analysis I and Analysis II sessions in reducing intention to smoke. The Analysis I session was successful, but only for the A + A workshop in reducing intention to smoke. Thus, H1 was partially supported for behavioral intention, with results showing the success of the Production session over Analysis I and Analysis II sessions. However, results do not document that overall, the A + P workshop is more successful than the A + A workshop in reducing intention to smoke.

Results for Attitude Toward Smoking

The same four steps were involved in testing both between-subject and within-subject differences for workshops on attitude (see note 6). Due to transformation (see note 3), nonparametric equivalent tests of relevant ANOVA procedures (Kruskal-Wallis tests) and repeated measure MANOVA (Friedman tests) were conducted for comparisons.

Between-subject comparisons. Kruskal-Wallis tests conducted to examine the difference between A + A and A + P workshops, and control groups from Times 1 through 4 on attitude toward smoking revealed no significant differences between the three groups (see Table 2). Thus, the results demonstrate no between-subject differences between the groups on attitude toward smoking at Times 1 through 4 (Step 1 confirmed, but Steps 2, 3, and 4 not confirmed).

Within-subject comparisons. Friedman tests were conducted to assess the change in attitude toward smoking

To show that the control group is equal on outcomes at baseline and postintervention; Step 2: To show the cumulative effects of Analysis I and Analysis II sessions for A + A workshop; Step 3: To show the cumulative effects of Analysis I and Production sessions for A + P workshop; Step 4: To show the difference in change in outcomes between Times 3 and 2 for A + A and A + P workshops.

⁷For sample comparability, three independent variables were crossed in a series of three-way ANOVAs with participants nested in combinations of workshop types (A + A, A + P, and control group), grade (6th, 7th, and 8th), and school (A and B). There were no significant two- or three-way interaction effects for behavioral intention. The main effects for workshop type, $F(2, 214) = .58, p = .56, \eta^2 = .01$; grade, $F(2, 214) = 1.50, p = .23, \eta^2 = .01$; and school, $F(1, 214) = .14, p = .71, \eta^2 = .00$ were also not significant.

TABLE 2
Cell Means of Workshop Types for Behavioral Intention, Attitude Toward Smoking, and Subjective Norm

	<i>Behavioral Intention M (SD)</i>	<i>Attitude Toward Smoking (Mean Ranks)</i>	<i>Subjective Norm (Mean Ranks)</i>
Attitude Time 1 – F/χ^2	$F(2, 224) = 0.60$	$\chi^2(2) = 0.34$	$\chi^2(2) = 1.62$
A + A	2.01 (1.00)	115.92	108.31
A + P	1.87 (1.09)	112.27	115.13
Control	1.84 (0.91)	118.03	122.82
Attitude Time 2 – F/χ^2	$F(2, 170) = 1.56$	$\chi^2(1) = 0.19$	
A + A	1.63 (0.81)	85.42	—
A + P	1.87 (0.98)	88.39	—
Control	—	—	—
Attitude Time 3 – F/χ^2	$F(2, 171) = 0.45$	$\chi^2(1) = 0.21$	
A + A	1.71 (0.84)	89.61	—
A + P	1.59 (0.79)	86.51	—
Control	—	—	—
Attitude Time 4 – F/χ^2	$F(2, 232) = 4.04^*$	$\chi^2(2) = 5.46$	$\chi^2(2) = 1.76$
A + A	1.60 (0.76)	119.45	107.04
A + P	1.55 (0.69)	108.32	119.92
Control	1.90 (0.92)	131.82	116.89

Note. A + A = Analysis + Analysis; A + P = Analysis + Production.

* $p \leq .05$.

over time with follow-up Sign tests.⁸ The Friedman test for the control group was not significant (Step 1 confirmed), but Friedman tests for the A + A and A + P workshops were significant (Steps 2 and 3 confirmed).

Six Sign tests were conducted to examine the change in percentage of participants who indicated differential attitude toward smoking for Times 1 through 4 (separately for A + A and A + P; recall that a higher score for attitude toward smoking indicates a stronger/positive attitude toward smoking). Of the six Sign tests conducted to evaluate the change in attitude toward smoking for the A + A workshop from Time 1 through Time 4, none was significant.

Of the six Sign tests conducted to evaluate the change in attitude toward smoking for the A + P workshop from Time 1 through Time 4, only one was significant. Of all the participants who indicated differential scores for attitude toward smoking at Time 1 and Time 4, 79% showed greater attitude toward smoking scores at Time 1 (than at Time 4), $z = -2.97$, $p \leq .008$. Thus, a larger proportion of participants in the A + P workshop demonstrated that their supportive attitude toward smoking was higher at Time 1 as compared to Time 4.⁹

⁸Six Kruskal-Wallis tests were run with workshop type (A + A, A + P, and control group), grade (6th, 7th, and 8th), and school (1 and 2) as independent variables and attitude toward smoking and subjective norm as dependent variables. The results of the tests were not significant.

⁹In addition, to examine the difference between Times 2 and 3 attitude toward smoking scores for participants in the A + A and A + P workshops, a difference variable was created (attitude toward smoking Time 2 – Time 3). A nonparametric equivalent of the independent sample t test (Mann Whitney) was conducted with the difference score as the dependent variable and workshop type as the independent variable. The results revealed that the difference score between A + A (Mean Rank = 84.28)

Summary for attitude toward smoking. The between-subject analyses were not significant for attitude toward smoking for the A + A or A + P workshops or the control group (at Times 1–4). The within-subject analyses revealed that only the A + P workshop was successful in reducing attitude toward smoking from Time 1 to Time 4. Thus, H1 was partially supported for attitude toward smoking, with results revealing that over time, the A + P workshop was more successful in reducing positive attitudes toward smoking. However, the results do not document that, overall, the A + P workshop was more successful than the A + A workshop in reducing favorable attitudes toward smoking.

Results for Subjective Norm

The same four steps were involved in testing subjective norm for between-subject and within-subject differences for workshops (see note 6). Due to transformation (see note 3), nonparametric equivalent tests were again conducted for between-subject and within-subject comparisons.

Between-subject comparisons. Kruskal-Wallis tests conducted to examine the difference between that A + A and A + P workshops and the control group from Times 1 through 4 on subjective norm revealed no significant differences between the three groups (see Table 2). Thus, the results show that there were no differences between the groups on subjective norms at Times 1 through 4 (Step 1 confirmed, but Steps 2, 3, and 4 not confirmed).

and A + P workshop (Mean Rank = 86.61) was not significant ($z = -.42$, $p = .67$; Step 4 not confirmed).

Within-subject comparisons. Friedman tests were conducted to assess the change in subjective norm over time with follow-up Sign tests (see note 8). Friedman tests for the control group and the A + A and A + P workshops were significant (Step 1 not confirmed, but Steps 2 and 3 confirmed).

One Sign test was conducted to examine the change in percentage of participants who indicated differential subjective norm for Times 1 through 4 (separately for the A + A, A + P, and control workshops; recall that a higher score for subjective norm indicates a greater subjective norm related to smoking, thus, more perceived support for smoking). The Sign test for the A + A workshop was significant, $z = -3.83$, $p \leq .001$. Of all the participants who indicated differential scores for subjective norm at Time 1 and Time 4, 72% showed greater subjective norm scores at Time 1 (than at Time 4). Thus, a larger proportion of participants (in the A + A workshop) had less positive subjective norm scores at Time 4 as compared to Time 1.

The Sign test for A + P workshop was also significant, $z = -4.04$, $p \leq .001$. Of all the participants who indicated differential scores for subjective norm at Time 1 and Time 4, 73% showed higher subjective norm scores at Time 1 (than at Time 4). Thus, a larger proportion of participants in the A + P workshop also had less positive subjective norm scores at Time 4 as compared to Time 1.

In addition, the Sign test for control group was significant, $z = -3.74$, $p \leq .001$. Of all the participants who indicated differential scores for subjective norm at Time 1 and Time 4, 77% showed more positive subjective norm scores at Time 1 (than Time 4). Thus, a larger proportion of participants (in the control group) had less positive subjective norm scores at Time 4 as compared to Time 1. Therefore, the results showed that for all workshop types (A + A, A + P, and control group), a larger proportion of participants had less positive subjective norm scores at Time 4 as compared to Time 1.

Summary for subjective norm. Overall, between-subject analyses revealed no differences across groups for subjective norm for the workshops or the control group (at Times 1–4). The within-subject analyses revealed that all workshop types, including control, were successful in reducing norms supporting smoking from Time 1 to Time 4. Thus, H1 was not supported for subjective norm. The results did not document that the A + P workshop was more successful than the A + A workshop in reducing favorable subjective norm toward smoking.

DISCUSSION

This study examined changes in behavioral intention to smoke, attitude toward smoking, and subjective norm to understand efficacy of two school based smoking intervention approaches (A + A and A + P). These workshop

approaches involved participants differently in generating counterarguments against smoking. The findings from this study provide some support in favor of the analysis plus production approach, and to a lesser extent the analysis approach, in bringing about some of the desired changes in relation to adolescent smoking.

Behavioral Intention to Smoke

Both workshops were effective in changing intention to smoke from Time 1 to Time 4, compared with the control group. This finding provides support for the use of interventions to reduce smoking intention (and potentially smoking behavior). Health-based interventions (especially interventions based on smoking) targeted toward adolescents can be successful in reducing intention to engage in smoking behavior (e.g., Dijkstra & De Vries, 2001; Johnston, Terry-McElrath, OMalley, & Wakefield, 2005; Tobler, 1986; Valente, Hoffman, Ritt-Olson, Lichtman, & Johnson, 2003). However, these studies do not address specific aspects of message design and processes that influence adolescents' intention to smoke. This study addressed the issue of message design by comparing two media-literacy based approaches to inoculation.

One of the findings of the study was greater effectiveness of the Production session in reducing smoking intention. In both workshops, intention to smoke at Time 1 was reduced significantly at Times 2 through 4. Although participation in A + A workshops resulted in reduction of smoking intention, the results did not document an independent contribution of the two workshop sessions (Analysis I and Analysis II). The A + P workshop, however, showed that the Production session at Time 3 was more effective than the Analysis I session at Time 2 (and Analysis II session at Time 3) in reducing behavioral intention to smoke. However, because the change in behavioral intention was not documented at both Times 3 and 4 for the two workshops, the results could also have been due to testing effects. Therefore, we cautiously suggest that these results demonstrating reduction in intention to smoke over time provide some support for both inoculation theory and the TRA. When participants were given "small doses" of an opposing viewpoint (e.g., "smoking is cool") and prompted to resist it by creating their own posters, the process brought about a greater resistance to persuasion. The process of creating resistance to persuasion was aimed at changing participants' attitudes and subjective norm by virtue of participating in the workshops and generating counterarguments in peer groups, respectively.

The greater efficacy of the Production session can also be explained by using the concept of self-persuasion (see Geller, 2001; Simons, 1976). Because the Production session was designed to engage students in creation of refutational arguments in posters, it provided them an opportunity for self-persuasion. Self-persuasion, thereby, led to

strengthening of participants' resistance to persuasion for cigarette smoking. Self-persuasion can lead to an enhancement of the kind of internal dialogue needed to maintain behavior and can therefore be more efficacious (Geller, 2001). Self-persuasion works best when the motivational strategy is indirect and less obvious (Geller, 2001; Simons, 1976). The approach taken in the Analysis I and Analysis II sessions of the workshops involved more use of direct persuasion strategies, whereas the approach taken in the Production session involved the use of self-persuasive indirect strategies. It can thus be inferred that interventions designed to encourage self-persuasion work better than those that work on principles of direct persuasion. This study documented some superiority of the A + P workshop in reducing intention to smoke over the A + A workshop. The greater efficacy of the A + P workshop can be attributed to the likely induction of self-persuasion and an opportunity for creative self-expression in Production compared with Analysis II session.

Attitude Toward Smoking

The results demonstrating changes in attitude toward smoking over time also showed greater support in favor of the A + P workshop. Participation in the A + P workshop was more effective than participation in the A + A workshop in changing attitude toward smoking from Time 1 to Time 4, although both were superior to the control group. The results for attitude toward smoking provide added support to the success of the production aspect of workshops, beyond behavioral intention to smoke. However, these findings should be interpreted with caution because between-subject analyses were not significant for attitude toward smoking for Times 1 through 4.

Engagement in production of antismoking messages may have encouraged counterarguing, whereas engagement in analysis of antismoking messages did not prompt counterarguing against positive aspects of smoking. The production strategy worked better in conferring resistance to smoking persuasion and was more effective in changing attitude over the time. Using production to confer resistance to "antitruism" arguments (attack on widely accepted beliefs, see [McGuire, 1961]) provides a new approach to designing inoculation-driven health messages (McGuire, 1961). According to inoculation theory (see McGuire, 1964), any intervention that engages participants actively should be superior to the passive intervention in triggering an active process of counterarguing (e.g., Chesebro, 1984; Graber, 1987).

The Production session provided participants with an opportunity of engaging in self-persuasion by creating their own antismoking messages rather than analyzing anti-smoking messages designed by others. Because most of the students already held negative attitudes toward smoking, both of the workshops provided them with self-generated

reasoning confirming their attitude to be the "true" or correct attitude. However, because the posters that the participants created in the Production session were displayed to the entire class, the social support arising from that public display may have facilitated participants' self-persuasion (see Hovland, Janis, & Kelley, 1953). This social support may also be responsible in bringing about a change in subjective norm toward smoking, discussed next.

Subjective Norm

The results demonstrating change in subjective norm over time showed support for both A + A and A + P workshops, as well as the control group. Again, these findings should be interpreted with caution because between-subject analyses were not significant for subjective norm for Times 1 through 4. According to the TRA, persuasive messages can be used to change normative beliefs by adding a new referent or increasing the relative salience of an existing potential referent (see O'Keefe, 2002). In this study, the relative salience of existing potential referents was changed by involving participants in self-generation of counterattitudinal messages in peer groups and an expression of counterarguments in front of peers.

Unexpected changes in subjective norm from Time 1 to Time 4 were also observed in the control group. The diffusion of information between participants by experimental condition or testing effects may have resulted in change in subjective norm for participants in the control group. This diffusion of information could have been a potential problem for the study if participants in the control group demonstrated changes on all key variables. Because no changes were observed in attitude and behavioral intention to smoke from Time 1 through Time 4, changes in subjective norm were not considered crucial. Therefore, it can be concluded that for the control group, talking among friends may have provided participants with the majority opinion regarding smoking. However, results also indicate that the size of change was highest in the A + P workshop, followed by the A + A workshop, and was smallest for the control group. Alternately, the Time 1 survey may have led to sensitization and heightened awareness, resulting in discussion with friends. This sensitization was not evident for changes in attitude but only for subjective norm.

Therefore, this study documents that by increasing the salience of participants' referents' opinions about smoking, it was possible to bring about a change in subjective norm from Time 1 to Time 4. In addition, a clearer understanding of the opinions of peers may have provided the cues necessary for self-persuasion that eventually resulted in reduction of subjective norm in favor of smoking. Diffusion of information may account for the observed changes in the control group, but these changes were not apparent for attitude toward smoking and behavioral intention to smoke. One reason may be the nature of these variables. Norms are more

“social” in nature and are more susceptible to such changes compared to more individual variables such as attitude and behavioral intention.

IMPLICATIONS FOR SMOKING INTERVENTION PROGRAMS

The results of these data reinforce the need for theoretically driven campaigns called for by other researchers (e.g., Ajzen & Fishbein, 1980; Hornik, 2002). This study employed a combination of the TRA and inoculation theory, useful frameworks for designing smoking prevention interventions via school-based media literacy smoking workshops. By using these theoretical frameworks, it was possible to see the differential patterns of effects, including changes in attitude, norm, and behavioral intention.

First, inoculation theory provides an avenue for persuasive efforts. Whereas the TRA proposes changes in attitude, subjective norm, or relative weights of the two components in relation to behavioral intention for persuasive efforts, inoculation theory provides a framework for message/campaign design and subsequent change by developing inoculative messages to resist persuasion against cultural truisms related to health behaviors.

Second, this study points to a key factor in intervention/campaign design, namely participant involvement in message creation. Florida's *Truth Campaign* demonstrated success because of use of strategies to empower adolescents through engagement with message (see Zucker et al., 2000). This study also revealed that A + P workshop worked better than A + A workshop in changing participants' attitudes toward smoking, subjective norm, and behavioral intention to smoke. Analysis versus production media literacy workshops make an important contribution, as participant involvement in message generation/design opens up avenues for self-persuasion. This study is the only data-based test to date comparing the two inoculation-driven media literacy strategies.

Third, self-persuasion is another aspect that has not been well researched in regard to health intervention/campaign efficacy. This study provides support for one mode of encouraging self-persuasion (getting students involved in producing their own antismoking posters). Intervention/campaign efforts toward promoting self-persuasion clearly merit attention.

LIMITATIONS

There are several limitations of the study worth considering. Although these data must be interpreted with sampling biases in mind, obtaining a random sample of adolescents is difficult given increasingly limited access to schools. These data consisted primarily of Hispanic adolescents, and other

racial groups (e.g., African Americans, Asians, Whites, and Bi-/Multiracials) were underrepresented. According to the Surgeon General's report, smoking rates in the United States among Hispanic adolescents are on the rise (United States Department of Health and Human Services, 1998). The tobacco industry is aggressively marketing to Hispanic youth, as can be evidenced from the launch of the \$40 million advertising campaign targeting predominantly African American and Hispanic markets (Brown & Houseman, 2000). Therefore, it becomes imperative to focus some antismoking efforts at minority populations. This study did not look into other sociodemographic factors that may be crucial factors in smoking among Hispanic youth and that could be examined in future culturally driven research.

There are several design limitations in this study. Due to logistical problems, true randomization was not possible and instead, different sections of each grade (6th, 7th, and 8th) were assigned to the various experimental or control groups. However, this quasi-experimental design was chosen as a trade-off for obtaining access to the schools (random assignment by individual within school is more disruptive for this type of intervention). Although analyses included both between-subject and within-subject, other analytic methods such as intraclass correlations could be conducted explore classrooms as the level of analysis (effects were minimal). In addition, using the same measures for beliefs, attitude, and behavioral intention at four times during the 5-week data collection period was necessary to evaluate changes over time. Using the same items could have sensitized the participants to the measures. In addition, the control group was measured only at times 1 and 4, contributing to possible testing effects in the design.

The procedure for the study involved random assignment of classes to group 1 (A + A), group 2 (A + P) or a control group. Detecting testing effects would be possible utilizing a Solomon design, but with the control group and two testing groups, the study provides credible evidence for changes in the outcome variables. A better design would include more schools, more classes, more subjects, and more groups. Finally, other workshop processing/message evaluation measures could have been included to explain processes that led to changes in attitude, subjective norm, and behavioral intention.

FUTURE RESEARCH

There is still much work needed in the area of inoculation theory and its application to health-based campaigns/intervention for adolescents. This study demonstrates how experiential learning may be used to inoculate young adolescents against future persuasive smoking messages, in combination with TRA. Future researchers should consider if inoculation can be used for self-persuasion, leading to an enduring attitude/norm change,

and further, change in behavior. The exact course of message processing that leads to inoculation needs exploration. In addition, how can inoculation be used with the other existing health communication theories to provide a solid framework for intervention/campaign design? Can inoculation be used for reducing reactance and ensuring self-persuasion by adolescents on health behaviors concerning them (e.g., safe sex, drinking and driving, marijuana use, and others)? These questions should be explored to extend suitable frameworks for health interventions/campaigns.

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