

ORIGINAL ARTICLE

## Analysis Versus Production: Adolescent Cognitive and Attitudinal Responses to Antismoking Interventions

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*This study examined cognitive and attitudinal responses of adolescents to two inoculation-based media-literacy intervention approaches designed to reinforce adolescents' attitudes against smoking. Participants were junior high students (sixth, seventh, and eighth grade) from schools in the northeast. Two kinds of experimental workshops and a control group were used in a repeated measure nonequivalent group experimental design. The two intervention workshops developed included analysis (where participants discussed and analyzed cigarette and antismoking ads) and production (where participants discussed, analyzed, and then created their own antismoking ads). Results showed an overall support for the production workshop in eliciting more attention and positive workshop perceptions than the analysis workshop. The production workshop was also successful in reducing positive attitudes toward smoking over time. Implications and directions for future research are discussed including implications for theories of message processing.*

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Smoking is a significant health problem and is the leading cause of preventable morbidity and mortality in the United States (Haire-Joshu, Glasgow, & Tibbs, 2004). Elaborating the success of interventions targeting smoking is crucial to reduce the risk of smoking among adolescent populations (see Myers, Brown, & Kelly, 2000). Children and adolescents voice stronger negative attitudes toward smoking than older adolescents (see Pfau, 1995; Porcellato, Dugdill, Springett, & Sanderson, 1999). Thus, the transition from primary to middle school is seen as a critical period when negative attitudes toward smoking begin to deteriorate leading to experimentation with smoking, regular smoking, and tolerance of smoking by peers (Gilpin & Pierce, 1998; Pfau, Van Bockern, & Kang, 1992). This transition period creates more indifference to health consequences of smoking among adolescents (Rokeach, 1987) and makes them more vulnerable to peer pressure (Friedman, Lichtenstein, & Biglan, 1985; Gottlieb & Baker, 1986).

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Inoculation theory (see McGuire, 1964) provides a valuable approach to smoking prevention at the transition stage (from primary to middle school) because young adolescents often have established attitudes opposing smoking. Inoculation theory explains that people can be motivated to build up resistance to attacks on their attitudes by being exposed to weakened attitude-threatening messages (McGuire). Recent research by Pfau et al. (2005) concludes that “inoculation accomplishes resistance through the process of overt counterarguing” (p. 434). Results of their study also demonstrated that inoculation strengthens attitude certainty, which fosters resistance (Pfau et al.). The point of transition from primary to middle school provides an especially good opportunity for inoculation because adolescents possess attitudes against smoking that are under pressure during this period (Pfau, 1995). The present study developed inoculation-based smoking interventions using media literacy as a tool for developing the workshops and examined the efficacy of the two prominent media literacy strategies (analysis or production) in changing smoking-related attitude and other cognitive responses.

### **Media literacy as a strategy for antismoking intervention**

Consistent messages about cigarette smoking from different media channels may have an amplified effect on adolescent smoking (see Wakefield, Flay, Nichter, & Giovino, 2003). Media literacy advocates an understanding of various kinds of mass media available in contemporary society, an identification of the functions of the media, and an engagement that allows students to critically and consciously examine media messages (Considine & Haley, 1992). Unger, Cruz, Schuster, Flora, and Johnson (2001) have suggested that media literacy programs could be developed to inoculate adolescents against tobacco marketing strategies. Two approaches to media literacy have included analysis (deconstruction) skills and production (creative communications) skills (Thoman, 2004). Media literacy can be used as a novel strategy of conferring resistance to individuals by getting them engaged in either analysis or production of refutational arguments to protobacco messages. These modified forms of self-persuasion can be expected to strengthen an individual's resistance to counterpersuasion.

#### **Media literacy and analysis approaches**

Proponents of the media literacy analysis approach maintain that media are actively engaged in the process of creating meaning, and audiences are members of specific subgroups that share a particular cultural orientation (Morley, 1980). A media “text” is not understood in a vacuum; rather, it is understood through contextualizing the media by focusing on issues of economic, cultural, social, and historical importance (Masterman & Mariet, 1994). Media literacy training based on such logic focuses on analyzing and critiquing media messages. Because the students are involved in a critical examination of media messages, this strategy is called the “analysis” module of media literacy and is expected to increase refutational skills.

### **Media literacy and production approaches**

Another approach to media literacy education focuses on understanding and applying the production process of media in order to create media message (Fisherkeller, 2000; Zettl, 1998). Proponents of the production approach believe that “practical work was not an end in itself, but a necessary means to develop a critical understanding of the media” (Masterman & Mariet, 1994, p. 59). Providing opportunities for adolescents to create their own media stories, documentaries, or news can help students understand the entire process of media production (Kubey, 2000). The production approach to media literacy is highly student centered and is often credited for increasing student self-esteem by engaging them and providing opportunities for self-expression (Tyner, 1992). Because the students are themselves involved in creating some type of media message(s), this strategy is called the “production” module of media literacy.

### **Comparison of analysis and production**

The two strategies of media literacy training, analysis and production, have been used in creation of media literacy curricula (see Austin, Pinkleton, Cohen, & Miller, 2003; Bergsma & Ingram, 2001). However, for practical and economic purposes, it becomes necessary to evaluate the difference in efficacy of the two strategies. No research to date has tested message analysis versus message production strategies for cognitive and attitudinal changes, and the present study compared these two approaches to antismoking intervention/efforts. The analysis approach included analysis and critique of both cigarette advertisements and antismoking advertisements and billboards. The production approach included analysis and critique of cigarette advertisements followed by creation of antismoking posters.

### **Cognitive approaches to smoking prevention**

Prior research on media literacy has not fully examined the process of change with smoking interventions. An understanding of cognitive responses to smoking prevention messages is key to effectively creating messages. Cognitive responses to messages have included measures of attention, comprehension, and learning (see Anderson & Lorch, 1983; Cullingford, 1984; Gunter, 2000). Exploring attention to and comprehension of the content and procedure will determine if and what type of change occurred as a result of the intervention.

### **Attention to smoking prevention workshops**

Attention to smoking prevention workshops has not been explored by researchers and merits inquiry to better understand specific features of workshops that engage students. For the purpose of the present study, attention has been conceptualized as the amount of invested mental effort (AIME) in nonautomatic elaboration of material (see Salomon, 1981). According to Salomon (1984), the amount of mental effort invested will determine whether the cognitive processing of the material has been

deep or shallow. Although AIME is short term, it can lead to long-term interest in the subject matter, better comprehension, and learning.

By bringing media into the classrooms, students' level of involvement and enthusiasm can be heightened, making them more active participants in classroom (Hobbs, 2001). In terms of analysis and production strategies of media literacy, it can be argued that production is a more novel and creative way of teaching in a classroom situation because students are encouraged to create their own media. Tyner (1992) heralds the production aspect of media literacy as an engaging and creative method of teaching media education. Novelty has been explored as a significant predictor of attention with results showing that novel material (appropriate to the age group) elicits more attention from children as they are attracted to a new media, information, or material (e.g., Singer, 1980; Wakshlag, Day, & Zillman, 1981). The present study involves two approaches to antismoking efforts, analysis, and production. The production approach offered a more novel and unique way of combining traditional literacy approach with a more hands-on approach to literacy and was therefore expected to attract more attention from students. Therefore, it was hypothesized:

H1: Adolescents will expend more mental effort for production than for the analysis workshop.

#### **Comprehension of smoking prevention workshops**

Learning comprised both attention and comprehension (see Anderson & Lorch, 1983; Cullingford, 1984; Gunter, 2000). Comprehension of smoking prevention workshops involves what the students can recall and understand in relation to workshop activities and topic. Comprehension as a cognitive process implies building up a temporary structure of information about the state of the task (Bainbridge, 1988).

Based on reactive theory (see Bandura, 1977), which describes comprehension resulting from attention, it follows that if a production workshop elicits more attention, it should also result in more comprehension as production activities may sustain students' interest for longer duration. In addition, experiential learning (Rogers & Freiberg, 1994) emphasizes the use of applied knowledge and describes self-initiated learning as more lasting and pervasive than other kinds of learning. Media production can be regarded as an experiential activity whereby the students apply their experience, knowledge, and engage in interaction to create their own message. Balch (1998) also suggests that getting students more involved in designing advertisements and other aspects of smoking prevention efforts may prove more beneficial because it would be a different approach than the traditionally used approaches such as lecturing and preaching about right/wrong. Therefore, participation in production workshops should involve students more than analysis workshops and elicit more comprehension from students. Thus, it was hypothesized:

H2: Adolescents in the production workshop will demonstrate more comprehension and more delayed comprehension than those in the analysis-only workshop.

### Workshop perceptions

Besides attention and comprehension, cognitive processing has also been studied in understanding affective responses (e.g., Gibbs, 1999; Unnikrishnan & Bajpai, 1995). Mandler's (1982) schematic incongruity model is based on the premise that whenever there are incongruities between incoming sensory information and expectations that are associated with schema held in long-term memory, activation of the autonomic nervous system occurs. Activation of the autonomic nervous system generates some form of emotional intensity. Even slight incongruities between sensory inputs and schemas have shown uniformly positive impact on mood (e.g., Donohew, 1984; Donohew, Palmgreen, & Duncan, 1980).

In the preceding sections, it has been argued that media literacy production is a more novel and creative way of teaching in a classroom situation as students are encouraged to create their own media. Novelty, regardless of the subject matter, may have some influence on physiological arousal (Bryant & Zillman, 1984; Christ & Biggers, 1984). Balch (1998) conducted focus group discussions with high-school smokers (aged 14–18 years) to understand students' reactions to potential antismoking program elements among others. Students' expectations about antismoking programs included approaches such as lecturing, preaching, nagging, and pushing. Students reported that approaches like these would be more likely to turn them off or incline them to stay away from intervention programs (cf. reactance). Balch suggested that creative advertising opportunities may appeal to students and can involve students in designing such antismoking or quitting efforts/programs. Therefore, it can be inferred that creative opportunities like designing antismoking posters will be more appealing to students than analyzing posters created by others. Therefore, it was hypothesized:

H3: Adolescents will demonstrate more favorable workshop perceptions of the production than the analysis workshop.

### Changes in attitude

One goal of the workshops was to help students analyze arguments underlying smoking and counter those ideas by either creating an antismoking poster or further analyzing antismoking ads and billboards. One underlying mechanism operating within these activities was to reinforce an unfavorable attitude related to cigarette smoking.

Research on the relationship between comprehension and attitude has shown that increased comprehension or knowledge on a subject can lead to attitude change (e.g., Turner, 1993; Vollands, Topping, & Evans, 1999). Because production is hypothesized to account for more attention and comprehension than analysis workshops, production activities should lead to greater changes in attitude. An approach to self-persuasion that has been explored previously focuses on the effects of having students become producers and organizers of persuasive information (e.g., Friedrich, 1990; Mayher, Lester, & Pradl, 1983). If the same idea is applied to tobacco prevention efforts, it can be inferred that activities that involve students by making them

producers and organizers of persuasive information will be more successful in changing students' attitude toward smoking (making their attitudes more negative regarding smoking). Therefore, it was hypothesized:

H4: Participants in the production workshop will demonstrate more smoking-related attitudinal change than participants in the analysis workshop.

## Method

### Participants and procedure

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

The study consisted of a nonequivalent control group experimental design with four time measures, including random assignment of classrooms (not students) to the different experimental conditions. Classes (sixth, seventh, and eighth grades in two different schools) were randomly assigned to experimental group E1 (analysis workshop), experimental group E2 (production workshop), or a control group (see Table 1 for a description of the design). Both the experimental groups participated first in an analysis session, then either a second analysis session or a production session.

### Measurement instruments

Variables measured included attitude toward smoking, attention to workshop, workshop comprehension and recall, and workshop perceptions.<sup>1</sup>

#### *Attitude toward smoking*

Attitude toward smoking was measured as evaluation of behavioral beliefs but not belief strength (see O'Keefe, 2002) and contained three Likert-type items. One item was "I believe smoking is bad." Reliability (Cronbach's alpha) was .58, and factor analysis yielded a one-factor solution (eigenvalue = 1.68, 55.85% var.) 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 (Time 1  $M = 1.55$ ,  $SD = .65$ ).

#### *Attention to workshop*

Attention to workshop was measured at Times 2 and 3 using Salomon's (1984) AIME, modified for use in a classroom situation. Attention was measured by four items with responses ranging from 1 (*none*) to 4 (*very much*). One item was "The workshop made me think." Reliability was good (Cronbach's  $\alpha = .74$  at Time 2, .85 at Time 3), and factor analysis yielded a one-factor solution (eigenvalue = 12.24, 56.04% var.) with all items loading greater than .7. These four items were summed

**Table 1** Experimental Design

	Time 1 (Week 1) + Measures	Time 2 (Week 2) + Measures	Time 3 (Week 3) + Measures	Time 4 (Week 5) + Measures
Experimental group E1 (Analysis + Analysis) <i>n</i> = 84, 5 classes	Pretest (40 minutes) + attitude toward smoking	Analysis I (40 minutes) and intermediate test (15 minutes) + attitude toward smoking, attention to workshop, workshop comprehension and recall, workshop perceptions	Analysis II (40 minutes) and posttest I (15 minutes) + attitude toward smoking, attention to workshop, workshop comprehension and recall, workshop perceptions	Delayed posttest (40 minutes) + attitude toward smoking, workshop comprehension and recall
Experimental group E2 (Analysis + Production) <i>n</i> = 94, 5 classes	Pretest (40 minutes) + attitude toward smoking	Analysis I (40 minutes) and intermediate test (15 minutes) + attitude toward smoking, attention to workshop, workshop comprehension and recall, workshop perceptions	Production (40 minutes) and Posttest I (15 minutes) + attitude toward smoking, attention to workshop, workshop comprehension and recall, workshop perceptions	Delayed posttest (40 minutes) + attitude toward smoking, workshop comprehension and recall
Control group <i>n</i> = 57, 3 classes	Pretest (40 minutes) + attitude toward smoking	—	—	Delayed posttest (40 minutes) + attitude toward smoking

and averaged to form a composite scale, with a higher score indicating more attention to workshop (Time 2  $M = 3.09$ ,  $SD = .64$ ).

#### *Workshop comprehension and recall*

Workshop comprehension and recall were measured in two ways developed by the authors: comprehension and recall of the procedure employed in the workshops, and comprehension and recall of the content of the workshops.<sup>2</sup>

Two questions measured procedural comprehension and recall. Correct responses to each of the two questions varied by the workshop session. The first question, "Which of the following activities did you do today?" directly tapped into recall of activities the participants engaged in for the specific workshop session. This question had five dichotomous response options (e.g., produce cigarette ads, discuss ideas present in cigarette ads) and scoring was based on whether participants correctly checked the relevant option.

Content comprehension and recall were based on the structure and content of the workshops and varied according to the workshop session. For instance, in production workshop, the participants were shown a Joe Chemo antismoking poster. One question tapping into the content of the poster was, "In the Joe Chemo poster, what was he holding in his hands?" There were 4–5 dichotomous response options for all the comprehension items. The scores for both procedural and content comprehension and recall items were transformed with *accurate* (1) or *inaccurate* (0) response scores calculated for each response option.<sup>3</sup>

#### *Workshop perceptions*

Workshop perceptions scale was adapted from the scale developed by Greene and Brinn (2003), measured by nine Likert-type items.<sup>4</sup> For instance, "The messages in these workshops caught my attention." Factor analysis indicated a one-factor solution (eigenvalue = 4.59, 45.91% var.) with all items loading greater than .5. The reliability of this scale was good ( $\alpha = .87$  at Time 2, .87 at Time 3), with all item total correlations greater than .4 on this scale. These nine items were summed and averaged to form a composite scale, ranging from 1 to 5 with a higher score indicating more positive workshop perceptions (Time 2  $M = 3.78$ ,  $SD = .64$ ).

#### **Stimulus materials**

The workshop manipulation varied the processes involved in teaching smoking-related health workshops, keeping features such as the source, setting, length, and teaching format constant.<sup>5</sup> The workshop manipulated analysis of cigarette and antismoking 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).<sup>6</sup> The format for all workshops included an introductory overview or "the lesson" by the speaker, students dividing into small groups to elaborate with examples, groups reporting back to the class, and finally



a overall wrap-up by the speaker. The sample messages used in the workshops were held constant where possible (e.g., between Analysis II and production where both "Joe Chemo" and "Marlboro Country" were incorporated) to increase workshop compatibility except on the key dimension.

The Analysis I workshop (given to both workshop groups) aimed at introducing students to threat and refutational preemption (see Pfau, 1995) by exposing them to tobacco advertising using different persuasion techniques for target audiences and helping students analyze arguments missing from cigarette advertisements. The Analysis I workshop identified pro- and antismoking arguments in current message use and discussed (as a class and in small breakout groups) various refutational strategies using an activity for identification of smoking claims. After the introduction, participants in small groups were provided with a checklist of different persuasive techniques used in cigarette advertisements such as "cigarette smoking makes you look sexy" and "cigarette smoking gives you freedom from rules and restrictions." Groups were given sample magazine cigarette advertisements and asked to identify which persuasive appeals were used in the advertisements. Following this, in order to discuss refutational strategies, participants in groups discussed facts about cigarette smoking that were absent from the cigarette advertisements and reported back to the class on one of the sample messages. The Analysis I workshop ended with a class discussion of cigarette warnings and the target audience(s) for the particular advertisements.

The Analysis II workshop for the analysis experimental group aimed at providing students with follow-up reinforcing material to counter the messages provided by cigarette advertising (see Pfau, 1995) and examining antismoking messages. The students were involved in analysis of a different set of antismoking print ads to understand the arguments used in antismoking ads and explore the differences in ideas presented in smoking versus antismoking ads and refuting them. For instance, Marlboro Country advertisements show rugged cowboys on horseback with beautiful scenery. To demonstrate a different point of view, students were shown a parallel antismoking advertisement with a group of people smoking while huddled in the cold outside of an office building. Following this, each group was provided with sample antismoking advertisements and billboards and asked to analyze the message presented by comparing them with cigarette advertisements.

Recall from the design that the Analysis I workshop was common (in Week 2) to both Analysis II and production groups. The smoking message production workshop provided students with follow-up reinforcing material to counter the messages provided by cigarette advertising (see Pfau, 1995) and explore antismoking messages. Small groups of students were involved in the creation of designs for smoking-related messages. The groups were instructed to create an advertisement illustrating some arguments about smoking that are missing from cigarette ads and were given paper and markers to create their messages. At the end, each group presented their message to the class (thus, exposing others to alternative refutational strategies).

### Manipulation check and pilot testing

The analysis and production workshops were designed based on basic media literacy principles (see Austin et al., 2003; Bergsma & Ingram, 2001). In order to ensure standardization across manipulations, we used measures similar to Austin and Johnson (1997). The present study held constant the setting for manipulations (the classroom), researcher for conducting the workshops, and week and length for conducting the workshops to control for external events (see Austin & Johnson). Additionally, the manipulation varied the amount of novelty in the workshop delivery.

All three workshops were piloted with undergraduate students over several months ( $N = 148$ ). Each of the workshops was piloted multiple times (and audio-taped) to control delivery, content, length, and process, and this pilot testing was replicated until standardization was achieved. At the same time, measures were analyzed and refined. This pilot test demonstrated no difference for Analysis I versus Analysis II, but the participants in the production workshop ( $M = 3.69$ ,  $SD = .93$ ) perceived the workshop as more novel than the participants in the Analysis II workshop ( $M = 2.95$ ,  $SD = .90$ ),  $t(65.60) = 3.43$ ,  $p \leq .001$ . Additional 7-point semantic differential items explored differences in workshop perceptions. For these summed semantic differential items, there was no difference (as expected) between Analysis I and Analysis II, but the production workshop ( $M = 4.74$ ,  $SD = .92$ ) was rated more positively  $t(82.99) = -2.23$ ,  $p \leq .05$  than the Analysis II workshop ( $M = 4.28$ ,  $SD = .96$ ). On one item (pleased/annoyed), the production workshop ( $M = 5.41$ ,  $SD = 1.04$ ) was rated more pleasing  $t(76.22) = -5.87$ ,  $p \leq .001$  than the Analysis II workshop ( $M = 4.23$ ,  $SD = .78$ ), but there were no differences between Analysis I and Analysis II as expected.

In the main study, a  $t$  test exploring the difference in the novelty item as a function of workshop type showed that participants in analysis workshop at Time 2 ( $M = 3.37$ ,  $SD = 1.20$ ) did not differ significantly  $t(162.29) = .38$ ,  $p = .36$  from the participants in production workshop at Time 2 ( $M = 3.30$ ,  $SD = 1.09$ ) as expected with random classroom assignment in the design (both received Analysis I in Week 2). However, as with the pilot test, participants in the production workshop at Time 3 ( $M = 3.62$ ,  $SD = 1.08$ ) perceived the workshop as more novel than the participants in the Analysis II workshop at Time 3 ( $M = 3.28$ ,  $SD = 1.28$ ),  $t(157.54) = -1.83$ ,  $p \leq .05$ .

## Results

### Analyses

Correlations performed to explore the relations among variables revealed that attitude toward workshop (at Time 2) was positively correlated with workshop perceptions (at Time 2)<sup>7</sup>. Hypotheses were analyzed using analysis of covariance (ANCOVA).<sup>8</sup> Analyses for Hypothesis 4 involved testing both between-subject and within-subject differences.<sup>9</sup>

### Hypothesis 1

Hypothesis 1 proposed that adolescents would expend more attention at the workshop (at Time 3) in production than in analysis workshops, controlling for attention to workshop at Time 2. The ANCOVA for attention (at Time 3) revealed a significant covariate effect for attention to workshop (at Time 2),  $F(1, 166) = 52.58, p \leq .001, \eta^2 = .24$  and a significant main effect for workshop type,  $F(1, 166) = 13.34, p \leq .001, \eta^2 = .07$ . The means of the attention to workshop (at Time 3) adjusted for initial differences were ordered across the two workshop types. The adjusted mean for the production group ( $M = 3.38, SE = .06$ ) was greater than for analysis group ( $M = 3.06, SE = .06$ ). The difference in the adjusted means between the groups was significant,  $F(1, 166) = 13.34, p \leq .001$  (see Table 2). Thus, Hypothesis 1 was supported with participants paying more attention to production session of the workshop (at Time 3) keeping attention to workshop (at Time 2) constant. Because at Time 2 the Analysis I session was common to both experimental groups, the production session elicited more attention from participants than Analysis II session.

### Hypothesis 2

Hypothesis 2 proposed that adolescents would demonstrate more comprehension (at Time 3) and more delayed comprehension (at Time 4) in the production workshop than the analysis workshop, controlling for comprehension at Time 2 (see Table 2).

#### *ANCOVA results for workshop comprehension and recall (at Time 3)*

The ANCOVA for workshop comprehension and recall (at Time 3) revealed a significant main effect for workshop type,  $F(1, 167) = 224.82, p \leq .001, \eta^2 = .57$ . The

**Table 2** Means (and standard deviations) of Measured Variables Across Times

Variables	Time 1		Time 2		Time 3		Time 4	
	AA	AP	AA	AP	AA	AP	AA	AP
Attitude toward smoking <sup>a</sup>	1.73 (.70)	1.69 (.73)	1.56 (.73)	1.59 (.70)	1.61 (.76)	1.53 (.66)	1.57 (.70)	1.45 (.65)
Attention to workshop	Not measured		3.06 (.64)	3.08 (.59)	3.06 (.72)	3.38 (.59)	Not measured	
Workshop comprehension and recall	Not measured		23.33 (4.07)	24.13 (3.49)	11.82 (2.47)	7.43 (1.33)	6.39 (1.13)	5.05 (.97)
Workshop perceptions	Not measured		3.84 (.65)	3.73 (.60)	3.73 (.77)	4.05 (.61)	Not measured	

*Note:* AA = analysis plus analysis (analysis) workshop; AP = analysis plus production (production) workshop.

<sup>a</sup> Mean (and standard deviation) for attitude toward smoking for the control group at Time 1 was 1.75 (.72) and at Time 4 was 1.72 (.75).

means of the comprehension scores (at Time 3) adjusted for initial differences were ordered across the two workshop types. The adjusted mean for the analysis group ( $M = 11.80$ ,  $SE = .21$ ) was greater than the adjusted mean for production group ( $M = 7.47$ ,  $SE = .20$ ). The difference in the adjusted means between groups was significant,  $F(1, 167) = 224.82$ ,  $p \leq .001$ . Thus, Hypothesis 2 was not supported. In fact, results showed that participants had more workshop comprehension and recall (at Time 3) for the analysis than the production workshop. Because at Time 2 the Analysis I session was common to both groups, the Analysis II session resulted in more comprehension and recall from participants than the production session opposite of the prediction.

*ANCOVA results for workshop comprehension and recall (at Time 4)*

The ANCOVA for workshop comprehension and recall (at Time 4) revealed a significant main effect for workshop type,  $F(1, 166) = 27.96$ ,  $p \leq .001$ ,  $\eta^2 = .14$ . The means of the comprehension scores (at Time 4) adjusted for initial differences were ordered across the two workshop types. The adjusted mean for the analysis group ( $M = 6.39$ ,  $SE = .15$ ) was greater than the adjusted mean for production group ( $M = 5.11$ ,  $SE = .14$ ). The difference in the adjusted means between analysis and production groups was significant,  $F(1, 166) = 27.96$ ,  $p \leq .001$ .

Because the homogeneity of slopes assumption was violated, additional analyses were conducted to examine the difference between analysis and production workshops on workshop comprehension and recall at Times 2–4.<sup>10</sup> From all analyses, Hypothesis 2 was not supported. In fact, results showed that participants had more workshop comprehension and recall (at Times 3 and 4) for analysis than production workshops. Because at Time 2 the Analysis I session was common to both the groups, the Analysis II session resulted in more delayed comprehension and recall from participants than the production session. Overall, the results of all analyses demonstrate that Hypothesis 2 was not supported and was opposite predictions.

### Hypothesis 3

Hypothesis 3 proposed that adolescents would demonstrate more favorable workshop perceptions (at Time 3) in production than in analysis workshop, controlling for workshop perceptions at Time 2. The ANCOVA revealed a significant covariate for workshop perceptions (at Time 2),  $F(1, 164) = 203.36$ ,  $p \leq .001$ ,  $\eta^2 = .55$ . In addition, a significant main effect was found for workshop type,  $F(1, 164) = 21.67$ ,  $p \leq .001$ ,  $\eta^2 = .12$ . The means of the workshop perceptions (at Time 3) adjusted for initial differences were ordered across the two workshops. The adjusted mean for production group ( $M = 4.05$ ,  $SE = .05$ ) was greater than the adjusted mean for analysis group ( $M = 3.73$ ,  $SE = .05$ ). This difference in the adjusted means between workshops was significant,  $F(1, 164) = 21.67$ ,  $p \leq .001$  (see Table 2).

Thus, Hypothesis 3 was supported, with results showing that participants had more positive workshop perceptions (at Time 3) for production than analysis workshop. Because at Time 2 the Analysis I session was common to both experimental

groups, the production session resulted in more positive workshop perceptions than Analysis II session.

#### Hypothesis 4

Hypothesis 4 was analyzed using between-subject (for workshop differences) and within-subject (for differences across time) comparisons (see Baron & Kenny, 1986).

##### *Between-subject comparisons*

Kruskal-Wallis tests were conducted to examine the difference between the two workshop groups and control group from Times 1 through 4. Differences on median values of attitude toward smoking at Times 1–4 showed that there were no significant differences between the groups. Thus, there were no between-subject differences between the groups on attitude toward smoking at Times 1–4 (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 over time with follow-up Sign tests. Friedman test for control group was not significant,  $\chi^2(1, N = 56) = .60, p = .44$  (Step 1 confirmed). Friedman test for the analysis workshop was significant,  $\chi^2(3, N = 81) = 7.78, p \leq .05$  (Step 2 confirmed). Friedman test for the production workshop was also significant,  $\chi^2(3, N = 85) = 12.40, p \leq .01$  (Step 3 confirmed).

Six Sign tests were conducted to examine the change in percentage of participants who indicated differential attitude toward smoking for Times 1–4 (separately for analysis and production) (recall that a higher score for attitude toward smoking indicates a more positive attitude toward smoking). Of the six Sign tests conducted to evaluate the change in attitude toward smoking for analysis 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 production 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 more positive attitude toward smoking scores at Time 1 (than Time 4),  $z = -2.97, p \leq .008$ . Thus, a larger proportion of participants (in the production workshop) demonstrated that their attitude toward smoking was more positive at Time 1 as compared to Time 4.

##### *Summary for attitude toward smoking*

The between-subject analyses were not significant for attitude toward smoking for the workshops or the control group (at Times 1–4). The within-subject analyses revealed that only the production workshop was successful in reducing positive attitude toward smoking from Time 1 to Time 4.

## Discussion

Studies of message processing are key to understanding the impact of health messages and interventions, and the present study furthers understanding of message

effects in the context of media literacy campaigns. This study examined changes in cognitive and attitudinal responses to workshops as a function of workshop type (analysis vs. production), applying a rigorous design to a field dominated to date by single-group studies. The results demonstrated overall support for the production workshop eliciting more attention and more positive workshop perceptions than the analysis workshop as expected, with some additional positive effect for analysis workshops.

#### **Attention to workshop**

Participants paid more attention to the production workshop at Time 3, keeping attention to workshop (at Time 2) constant. Studies of effects of communication modality (medium through which communication is pursued, O'Keefe, 2002) on attention have shown that children's a priori knowledge (or metascripts) of the general nature and demands of the medium or communication modality influence attention and comprehension (e.g., Craik & Tulving, 1975; Salomon, 1984). Applying the same concept to a classroom situation, health-based classroom lessons are usually taught by the instructor and medium of message delivery is usually through lectures, exercises, posters, and handouts (e.g., Bruvold, 1993; Tingle, DeSimone, & Covington, 2003). The idea of creating their own medium (posters) for messages to peers or younger students may have resulted in active searching of other knowledge schemas (see Bordeaux & Lange, 1991) and greater attention paid to the production session. This strategy of creating their own medium could be applied to other novel activities such as writing a play, making a television script, and designing brochures, and this has not been explored and tested with rigorous designs.

Another aspect of communication modality that can bring about a change in attention is novelty (see Krull & Husson, 1979). Although novelty was not explored as a measure in the study, one item in the workshop perceptions scale tapped novelty of workshops. Perceived novelty was greater among participants in the production than the Analysis II session. Although based on limited evidence, it can be argued that the novelty aspect of the production workshop resulted in greater attention elicited by participants than the analysis workshop, and this would be a fruitful area for exploration.

#### **Workshop comprehension and recall**

Participants in analysis workshop showed greater workshop comprehension and recall at both Time 3 and Time 4 (as compared to participants in production workshop). These findings were not consistent with the hypothesis, and the analysis workshop proved more efficacious than production workshop in eliciting comprehension and recall. Although attention to workshop was greater in the production than the analysis workshops, comprehension and recall was greater in analysis workshops. Previous studies have shown no relationship between attention and comprehension (e.g., Krull & Husson, 1979; Lesser, 1974, 1977). For example, television programs that attract more attention from children may not lead to comprehension

(e.g., Lesser, 1974, 1977). According to the selective attention theory (see Klapper, 1960), when selective attention is paid to a stimulus, the more important aspects are ignored and learning is minimal. Based on this reasoning, participants may have paid more attention to the novel activity in the workshop (creation of posters) but not to areas measured by comprehension and recall. Therefore, the comprehension that was generated from participation in the workshops was more for analysis but not production workshop.

In addition, both analysis and production workshops provided opportunities for participants to engage in refutation of smoking behavior. The first workshop sessions provided some amount of forewarning to prepare the students against an impending attack. A similar format (i.e., analysis) in the subsequent workshop may have resulted in less attention but greater comprehension of the analysis workshop through repetition. The format for the analysis workshop was also more common and likely recognizable as more standard in school settings, perhaps aiding recall.

### **Workshop perceptions**

Participants in the production workshop had more positive workshop perceptions (liked more) at Time 3, keeping workshop perceptions (at Time 2) constant, consistent with Hypothesis 3. Research on the production module of health interventions (in media literacy literature) has shown that students enjoy creating their own messages more than they enjoy analyses of messages designed by others (e.g., Kubey, 2000; Tyner, 1992, 1998). Creating their own media not only empowers children and young adolescents but also provides them with an opportunity for reflecting on their learning (Tyner, 1998). According to Tyner (1998), the combination of analysis plus production creates a spiral of success for the students whereby analysis informs production, which in turn informs analysis. Because the production workshop included both types of activities (analysis and production), it provided students with an expression of their learning. Although expression of creativity and self-expression are not direct effects of media production activities, they often become important when reviewing the success of various activities (Tyner, 1998). That production techniques were perceived more favorably by students also implies that variety in communication (or health intervention) teaching methods is essential to maintaining student interest. Further research exploring message processing components crucial in the workshops (e.g., central vs. peripheral processing or refutational strategies) would be beneficial.

### **Attitude toward smoking**

Not only does this study demonstrate the superiority of production for attention and workshop perceptions but it also provides evidence for an underlying change mechanism (attitudes) often targeted by health campaigns. Participation in the production workshop was more effective than the attitude workshop in changing attitude toward smoking from Time 1 to Time 4. The results for attitude toward smoking reveal that 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 time. According to inoculation theory (see McGuire, 1964), any intervention strategies that engage participants actively are superior to the passive strategies in triggering an active process of counterarguing (e.g., Graber, 1987). The combination of analysis and production in the production workshop showed significant change in attitude toward smoking over time, rendering added support to sustained influence of inoculation or reinforcing.

In addition, the production session provided participants with an opportunity for engaging in self-persuasion by creating their own antismoking messages rather than analyzing antismoking messages designed by others. According to the self-perception theory (Bem, 1972), people infer their "true" attitude on an issue by rationally analyzing their recent attitude-relevant behaviors. Manipulation or intervention that increases the salience of one's preexisting attitude generally reduces the amount of self-persuasion resulting from counterattitudinal behavior (Bem; Snyder & Ebbesen, 1972). Because most of the students already had negative attitudes toward smoking, both workshops provided them with self-generated reasoning confirming their attitude to be the true or correct attitude.

#### **Implications for smoking intervention programs**

The results of these data reinforce the need for theoretically based campaigns (Hornik, 2002) absent from prior media literacy research. By using the theoretical frameworks employed in the study (a combination of the inoculation theory and media literacy interventions), it was possible to see the differential patterns of effects including cognitive and attitudinal changes. First, inoculation theory provides a framework for message design and subsequent change by developing messages to resist persuasion against cultural truisms related to health behaviors. Using media literacy and evaluating two media literacy strategies under the framework of inoculation theory demonstrates the need for other creative strategies in conferring resistance and inoculating adolescents against negative attitudes toward health behaviors.

Second, this study provides a test of pathways of influence for a new factor in intervention/campaign design, namely participant involvement in message creation. Florida's Truth Campaign demonstrated success including strategies to empower adolescents through engagement with messages (see Zucker et al., 2000). This study showed that the production workshop elicited more attention and more positive workshop perceptions from the participants. Therefore, participant involvement in message generation/designing opens up avenues for self-persuasion; however, more research is needed to separate effects for analysis workshop routes of processing from those of production as the workshops had different influences.

Third, self-persuasion is another aspect that has not been well researched in regard to health intervention/campaign efficacy. The present study provides support for one mode of encouraging self-persuasion (student involvement in producing



antismoking posters). It is relatively easy to generate reactance in adolescents, especially in the context of health behaviors due to extensive focus on long-term health consequences (Tobler, 1986). Intervention/campaign efforts toward promoting self-persuasion and reducing reactance 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 limited access to schools for multiple time periods. These data consisted primarily of Hispanic adolescents, and other racial groups were clearly underrepresented. Using the same measures at different times during the 5-week data collection period was necessary to evaluate changes over time, and this may have sensitized the participants to the questions. In addition, although the manipulations employed for the study worked, they were not as robust as we would have liked, with the effect of suppressing the results. Finally, other workshop processing/message evaluation measures could have been included to explain the process that led to changes in attitude.

### Future research

There is still much research needed in the area of inoculation theory and its application to large health-based campaigns/interventions for adolescents. The present study demonstrated that experiential learning via media literacy may be a successful way of involving young adolescents in inoculating them against future persuasive smoking messages. Researchers should consider if inoculation can be used for self-persuasion, leading to an enduring attitude change, and further, change in behavior. The exact course of message processing that best leads to inoculation, refutation, and counterarguing needs exploration. As noted by Pfau et al. (2005), further research is needed to fully account for the way in which inoculation confers resistance.

The results of this study indicated that creative and novel ways of designing health interventions or campaigns merit attention, especially creative ways of involving the target audience in message generation and self-persuasion. However, inclusion of more creative ways of generating self-persuasion should be explored. Interventions delivered by peers have been effective in changing attitude and intention (e.g., Koumi & Tsiantis, 2001; Prince, 1995). Peer-led interventions combined with message generation in peer groups also provide a possible avenue for future research.

It is important for smoking prevention programs to engage adolescents both cognitively and affectively. Nonengagement with an antismoking intervention has been reported as a risk factor for smoking, independent of other established risk factors (see Aveyard, Markham, Almond, Lancashire, & Cheng, 2003). Therefore, it is imperative for workshop planners to use creative ideas in order to engage adolescents in different ways if intervention efficacy is desired. More research is needed to demonstrate specific strategies that would lead to reduced resistance and greater

acceptance of messages. In school settings, it is also critical to use resources most efficiently, and more research such as this on processing media literacy and smoking messages would be useful.

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### Notes

- 1 All measures created by the authors were piloted with a sample of 110 undergraduate students enrolled in communication classes. Complete measures are available from the authors.
- 2 Comprehension and recall measures were combined to form one score.
- 3 For delayed posttest, recall measures were shortened versions of the procedural and content comprehension and recall measures used at Times 2 and 3.
- 4 Workshop perceptions was measured by the following nine Likert-type items, with 5-point responses ranging from 1 (*strongly agree*) to 5 (*strongly disagree*): "The messages in these workshops caught my attention," "These workshops said something important to me," "I learned a lot from these workshops," "These workshops were boring," "I enjoyed these workshops," "The workshops didn't tell me anything new," "The messages in the workshop were realistic," "This workshop was too long," and "I'd like to do more of this kind of workshop."
- 5 All the workshops were conducted by one of the authors.
- 6 Although the workshops used media literacy under the aegis of inoculation theory, the aim of the study was to examine cognitive and attitudinal changes that followed from participation in the various workshops.
- 7 Zero-order correlation matrix for all variables (at Time 2) revealed that the only significant correlations were between attitude toward smoking and workshop perceptions ( $r = -.22, p \leq .01$ ) and attention to workshops and workshop perceptions ( $r = .56, p \leq .01$ ).
- 8 Analyses employed in the study for testing of hypotheses were conducted with age and gender as between-subject variables. Results showed that there were no significant effects of age or gender on attention to workshop, workshop comprehension and recall, workshop perceptions, and attitude toward smoking; thus, we do not report these results here (available from authors).
- 9 Steps involved in between-subject analyses: (a) to show that groups are equal on outcomes at baseline, (b) to show that groups are different on outcomes postintervention, (c) to show that outcomes should change the same following the Analysis I workshop, and (d) to show that the production and Analysis II workshops generated different changes on outcomes. Steps involved in within-subject analyses: (a) to show that the control group is equal on outcomes at baseline and postintervention, (b) to show the cumulative effects of Analysis I and Analysis II sessions for analysis workshop, (c) to show the cumulative effects of Analysis I and production sessions for the production workshop, (d) to show the difference in change in outcomes between Times 3 and 2 for the analysis and production workshops.

- 10 Three *t* tests were conducted with the analysis and production workshops as the independent variables and workshop comprehension and recall at Times 2, 3, and 4 as the dependent variables. The difference between analysis workshop ( $M = 11.79$ ,  $SD = 2.48$ ) and production workshop ( $M = 7.47$ ,  $SD = 1.26$ ) on comprehension at Time 3 was significant,  $t(117.99) = 14.16$ ,  $p \leq .001$ . The difference between analysis workshop ( $M = 6.39$ ,  $SD = 1.14$ ) and production workshop ( $M = 5.11$ ,  $SD = .87$ ) on comprehension at Time 4 was significant,  $t(151.26) = 8.18$ ,  $p \leq .001$ .

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