



The National Association for Media Literacy Education's
Journal of Media Literacy Education 2:3 (2011) 185 - 198

School-based Smoking Prevention with Media Literacy: A Pilot Study

Melinda C. Bier, Spring J. Schmidt, David Shields

College of Education, University of Missouri, St. Louis, MO, USA

Lara Zwarun

Department of Communication, University of Missouri, St. Louis, MO, USA

Stephen Sherblom

School of Education, Lindwood University, St. Charles, MO, USA

Brian Primack

School of Medicine, University of Pittsburgh, Pittsburgh, PA, USA

Cynthia Pulley, Billy Rucker

University of Missouri, St. Louis, MO, USA

Abstract

School-based tobacco prevention programs have had limited success reducing smoking rates in the long term. Media literacy programs offer an innovative vehicle for delivery of potentially more efficacious anti-tobacco education. However, these programs have been neither widely implemented nor well evaluated. We conducted a pre-post evaluation of a cross-disciplinary tobacco media literacy program. The sample consisted of 204 students across six schools. Results indicated that students' smoking-specific media literacy and general media literacy measures increased significantly over the course of the intervention.

Keywords: tobacco prevention, anti-tobacco education, smoking media literacy

Introduction

Cigarette use remains the leading preventable cause of death in the United States (Mokdad et al. 2004; DiClemente, Santelli, and Crosby 2009). Of the 440,000 people who die from smoking each year, the vast majority began at age 18 or younger (Kaestle and Wiles 2009; Medicine 2001; Centers for Disease Control and Prevention 2005). Despite efforts to reduce adolescent smoking, 54% of high school students have tried cigarette smoking and 16% of high school students had smoked a whole cigarette before the age of 13 (DiClemente, Santelli, and Crosby 2009; Eaton et al. 2006). Those who try their first cigarette in adolescence are at greatest risk of becoming daily smokers by the age of 18 (Lantz et al. 2000; Elders et al. 1994; Escobedo et al. 1993) and are less likely to quit smoking (Institute of Medicine 2007). National behavior risk surveys consistently reveal that health risk behaviors

are most likely to develop during early adolescence (Fetro, Coyle, and Pham 2001), making that time period critical for targeted prevention programming.

Children in early adolescence may be particularly vulnerable to making unhealthy behavioral choices due to the social, emotional, and physical changes associated with puberty. This developmental stage typically begins between the ages of 10 and 15 and is characterized by psychological changes such as an increasing interest in the other sex and a desire for more independence from parents and more autonomy in decision-making (Dryfoos and Quinn 2005). During this developmental period, attitudes towards smoking tend to get more positive (National Cancer Institute 2008). Peer relationships often take on more importance during this phase of development and youth become increasingly concerned with the image they project. Marketers take advantage of this by presenting cigarettes and alcohol as components of a desirable, if totally unrealistic, lifestyle.

It is known that media exposure to smoking contributes strongly to initiation of adolescent smoking (Pierce et al. 1998; Dalton et al. 2003; Sargent et al. 2005; Charlesworth and Glantz 2005; Altman et al. 1996; Wakefield et al. 2003; DiFranza et al. 2006) or in persuasive contexts such as advertising and promotion (DiFranza et al. 2006; Wakefield et al. 2003). One promising strategy to reduce adolescent smoking, therefore, is to reduce exposure to media representation of smoking (Dalton et al. 2003; Glantz 2002; Sargent et al. 2004). However, it is not always possible and/or feasible to reduce such exposure. In fact, recent research has shown that the tobacco industry has been able to continue marketing effectively to adolescents despite the restrictions sought by the Master Settlement Agreement of 1998 (Roberts, Henriksen, and Christenson 1999; Zwarun 2006). In particular, adolescent exposure to tobacco-related point-of-sale promotions, messages in theatrical trailers, and counter-productive industry-sponsored "prevention" messages have increased (Farrelly et al. 2002; Wakefield et al. 2003; Loomis et al. 2006) to the extent that we must conclude that the tobacco industry is now as able to market to youth as it was prior to the Master Settlement Agreement (Sloan, Mathews, and Trogon 2004). A potentially more powerful tactic available to public health advocates would be to promote "media literacy," often defined as the ability to understand, analyze, evaluate and create media messages in a wide variety of forms (Aufderheide 1993; Buckingham 2003; Thoman 2003). Organizations such as the American Academy of Pediatrics, the Centers for Disease Control and Prevention, and the Office of National Drug Control Policy recommend media literacy to buffer the impact of mass media messages on adolescent smoking (Center for Disease Control and Prevention 2005; Committee on Public Education 1999; Office of National Drug Control Policy 2001). Consequently, many organizations integrate elements representing media literacy into their instructional programming.

Studies support these recommendations. For example, the American Legacy Foundation's "Truth" campaign and the Florida "TRUTH" campaign (Sly, Heald, and Ray 2001; Sly et al. 2001) are well-known programs that successfully reduced smoking among youth (Farrelly et al. 2005; Sly, Heald, and Ray 2001; Sly et al. 2001). These campaigns incorporated principles of media literacy, including discussing the motives of the tobacco industry and deconstructing its promotion messages (Hicks 2001). Similarly, the Washington State Department of Health conducted a pilot study

showing that media literacy improved variables related to smoking outcomes in both participants naïve to smoking as well as experienced smokers (Austin et al. 2005; Pinkleton et al. 2007). Additionally, adolescents' overall "smoking media literacy" has been shown to be strongly and independently associated with both reduced adolescent smoking and reduced susceptibility to future smoking (Primack and Hobbs 2009).

While results of school-based tobacco prevention programs have been mixed (Glantz and Mandel 2005; Wiehe et al. 2005), it is not a widely studied field and some researchers disagree with reports that school-based smoking prevention programs have not been successful in the long-term, citing methodological flaws that limit the value of their conclusions (Wiehe et al. 2005; Flay 2009). Using more nuanced inclusion criteria, Flay's evaluation found that school-based smoking prevention programs that include specific components, including media literacy, integrated curricular approaches, and fifteen hours or more of lessons, can have significant short and long-term effects (Flay 2009). Given that school-based programs remain the mainstay of youth tobacco prevention activities (Institute of Medicine 2007), there is a need for the development and testing of innovative and potentially more efficacious school-based tobacco prevention strategies.

Additional study of school-based media literacy programming to reduce smoking susceptibility is necessary. The Youth Empowerment in Action! (YEA!) Program addresses this need through an academically-integrated middle school curriculum addressing health, tobacco and media literacy factors. This research-based program focuses on the following research questions: 1) Is there evidence that students make gains in smoking media literacy over the course of the intervention? 2) Does the intervention also raise general media literacy? 3) What is the impact of the intervention on student attitudes toward smoking? 4) Is the intervention acceptable to students? The present study explores these issues.

Methods

This study is situated in a year-long school-based media literacy and civic engagement program that was conducted in middle schools in Missouri and included classroom lesson plans, community engagements, policy research and advocacy initiatives. The scope of this study is limited to the first program activity: the media literacy curriculum.

Intervention

The Youth Empowerment in Action! (YEA!) Program at the University of Missouri-St. Louis College of Education received a 3-year grant from the Missouri Foundation for Health to develop and implement a media-literacy-based anti-tobacco curriculum that could be used statewide. The project had an expanding cohort design, adding 10 additional schools every new school year during the grant, and then being offered for statewide participation. The media literacy curriculum was the first activity in a larger program model that included youth activism, media production and community engagement features. The media literacy curriculum is delivered in class by cross-disciplinary teams of teachers to all of their students as part of their regular learning activities.

Participants

The sample for this study consisted of students in 6 Missouri middle schools located in counties identified as having particularly high rates of tobacco use. Participating schools were recruited largely through identifying target school districts based on higher than average smoking rates. Schools were initially approached through the principal or other district-level leader to determine interest and readiness to participate. Interested schools submitted applications from teacher teams of at least three and no more than six teachers. The total number of participating teachers from the 6 sample schools was 29. Each participating teacher received \$1,000 as compensation for time he or she spent in training and co-development. While 406 students completed the pretest and 291 students completed the posttest, the present study reports data on those 6th-8th grade students with valid data who completed both assessments ($N = 204$). The students ranged in age from 10.0 to 13.6 ($M = 11.6$ years, $SD = 0.89$). The sample included 66 males and 138 females. Approximately 76.6% of the sample was White/European-American, 14.9% was African-American, and 8.5% identified themselves as another race (Table 1). At this time, there is no clear explanation for the difference in gender response rates.

The differences between the number of pre/post tests and the final sample were primarily caused by data cleaning. Incomplete instruments and instruments that could not be matched from Time 1 to Time 2 were not included. In addition, one of the sample schools gave the pre-test well outside the requested timeframe, after additional program activities had taken place. The re-

search team felt that this required the exclusion of that school from the sample.

Procedure

The intervention was designed to be consistent with the recommendations of the Centers for Disease Control for school-based tobacco prevention (CDC 1994), as well as with the Institute of Medicine (2001) and Office of Safe and Drug Free Schools' guidelines for effective prevention program implementation. There are three major aspects of the program: 1) two days (16 hours) of teacher training; 2) a cross-disciplinary media literacy based tobacco curriculum (lessons 1 – 13); and 3) service learning/community outreach opportunities through media production and advocacy (lessons 14 – 18). The program integrates three broad topics: tobacco education, media literacy training, and civic engagement. In addition, there were school-wide activities designed to involve peers, parents and families. This year-long middle school program is roughly divided into two phases so that the foundational interdisciplinary curriculum (lessons 1-13) is delivered in the first semester, with the experiential service learning/community outreach aspects falling in the second semester. Only the training and the foundational curriculum are described here and the post-tests were administered after lesson 13, prior to beginning the media production and advocacy phase.

While the pre/post data for the curriculum is the scope of this report, significant formative and process evaluations were conducted throughout the year, including workshop evaluations, lesson plan evaluations, community assessments and qualitative interviews. These measures were regularly reviewed and discussed by the project team so that obstacles or problems in any particular school's implementation effort could be addressed by the project support team as needed and for overall program improvement.

Middle School Teacher Team Training and Planning: Middle schools normally include grades 6 through 8 and generally differ from junior high schools in their use of teams of teachers working with the same group of students, interdisciplinary curriculum, advisory systems, and other provisions for personalization (ASCD 2009). The YEA! Program and the team approach allowed the teachers to break the curriculum into modules that could be delivered by different teachers in their classrooms and still continue to reach the same set of students. Depending on the size and structure of the middle school, teacher teams have between three

and six teachers per team, with four- and five-member teams most common. Ideally, an entire teacher team attends two days of training in the summer preceding implementation. For teachers unable to attend, training sessions were arranged by the project leaders who met on-site with the teams on a monthly basis.

The 16 hour training covers the three domains (Table 2) and eight media literacy factors (Primack, Gold, Land, et al. 2006; Primack, Gold, Switzer, et al. 2006) and their application in the tobacco-specific lessons provided by YEA! TEAM. Individual teachers each receive a facilitators' guide and curriculum binder. Additionally, each teacher team receives a binder with a color-coded Implementation Master Planning Guide, copies of the pre and post program student assessment, Lesson Implementation Evaluation forms, and Monthly Team Report forms. During the training, teacher teams engage in media literacy and curriculum activities, spend time planning as a group, and review with project staff the schedule for completing the project deliverables. The project team collected copies of team implementation artifacts to track implementation and fidelity and improve the program components and tools in a co-inquiry development process.

YEA!TEAM Curriculum: Recognizing that in addition to individual factors, tobacco use is influenced by the social, commercial, and political environment, the YEA!TEAM program is grounded in a socio-ecological framework. The lessons cover the short- and long-term negative physiologic and social consequences of tobacco use, social influences on tobacco use, the health consequences of secondhand smoke, ecological impacts of tobacco production and use, tobacco industry marketing tactics, and tobacco policy. The lesson plans drew from existing literature on both media literacy and anti-tobacco education and were developed by project members, often in partnership with participating teachers. In each case, to allow teachers to devote valuable class time to the lessons, they were tailored or designed to conform to the state's academic standards and Grade Level Expectations (see Table 2) and to encourage interactive, constructivist approaches to learning. Two general media education lessons were included, and all the tobacco lessons cover media literacy competencies that are aligned to the media literacy model developed by Primack, Gold, Switzer, Hobbs, Land, & Fine (2006). The content of the media literacy instruction focused on the three domains and eight fac-

tors (Table 2) of media literacy. Table 3 is a brief description of the topics of the individual lessons and the related media literacy factors.

Implementation of the foundational tobacco lessons took approximately 15 hours of class time. Within the trained teacher-teams, each content area teacher delivered 3 to 5 lessons in semester one, allowing all students to receive the sufficient intensity (Institute of Medicine 2007) to create change of curriculum without overburdening any one teacher.

Instrumentation

Prior to collection of data from the students, each student signed an assent form. Participation in the survey was voluntary, though curriculum participation was not (as it was considered a regular class activity required by the teacher). Careful instructions were given to teachers regarding procedures for distributing and collecting questionnaires to promote student confidence in the confidentiality of the data. Pretest data were collected prior to the beginning of the intervention and post-test data were collected within two weeks of completing lesson #13.

The survey-style assessment questionnaire, available on request from the first author, contained five main sections, including demographic data, smoking-specific media literacy, general media literacy, attitudes toward smoking, and attitudes toward the intervention. Each specific scale is described below.

Demographic data. The socio-demographic variables assessed were participants' age, gender, race/ethnicity, and mother/female guardian's education level, used as a surrogate for socio-economic status.

Smoking Media Literacy (SML). Eleven Likert-type items assessed this construct, drawn from three media literacy domains: Authors/Audiences, Messages/Meanings, and Representation/Reality (see Table 2 for their relationship to the eight Media Literacy Factors used in the curriculum). Representative items include "Certain cigarette brands are specially designed to appeal to young children" (Authors/Audiences); "Cigarette ads link smoking to natural things that people want like love, good looks, and power" (Messages/Meanings); and "Cigarette ads show scenes with a healthy feel to make people forget about the health risks" (Representation/Reality). Response options on the four-point Likert-type scale ranged from "Strongly Disagree" (1) to "Strongly Agree" (4). Scores on individual items were averaged to determine an overall

SML score and a subscale score for each of the 3 media literacy domains. Similar items were also assessed for reliability and validity in prior research.

General Media Literacy (GML). Similar in concept to the SML score, this scale also contained 11 items based upon the three core domains of media literacy. Representative items include “People who advertise think very carefully about the people they want to buy their product” (Authors/Audiences); “Two people may see the same advertisement and get very different ideas about it” (Messages/Meanings); and “Movies and TV shows don’t usually show life like it really is.” (Representation/Reality). Again, response options on the four-point Likert-type scale ranged from “Strongly Disagree” (1) to “Strongly Agree” (4), and scores on individual items were averaged to determine an overall GML score and sub-scales representing the individual domains. Similar items were also assessed for reliability and validity in prior research (Primack, Gold, Land, et al. 2006; Primack, Gold, Switzer, et al. 2006).

Attitude Toward Smoking (ATS). The ATS consists of nine items tapping attitudes toward smoking. Each item was scored on a four-point Likert-type scale which ranged from “Strongly Disagree” (1) to “Strongly Agree” (4). Except for one reverse scored item, the wording of each item suggested positive attitudes toward smoking. Representative items include, “Smoking cigarettes is enjoyable,” and “Smoking makes you look more mature.” All items were taken from widely used tobacco surveys.

Attitudes Toward Intervention (ATI). The final scale, administered only at post-test, assessed the students’ perceptions of the project. The 11 items in this scale tapped the extent to which participants found the program enjoyable and effective. Sample items include “I learned a lot during this program;” “I enjoyed this program,” and “I am less likely to smoke now that I have seen this program.”

Results

All six of the sample schools developed their own timeline for implementation, but the project artifacts gathered from the project team gave a strong indication that at least 90% of all of the lesson plans were delivered in all of the sample schools. This understanding was important for validating the intervention and making any results meaningful.

Psychometric Properties of Scales

Preliminary analyses were conducted to determine whether the scales were age-appropriate for the target audience, and psychometrics were run on the major scales (general media literacy (ML), smoking media literacy (SML), and pro-smoking attitudes) to lend a measure of validity to the measurement scales. For all analyses, individuals with missing data were eliminated. We defined statistical significance *a priori* as a two-sided alpha of 0.05.

Each outcome scale (smoking-specific media literacy, general media literacy, attitudes) was sufficiently unidimensional according to factor analyses, with the proportion of variance loading on the first factor ranging from 71% to 97%. Cronbach alpha coefficients for each scale ranged from 0.72 to 0.84, indicating that these scales were internally consistent. Additionally, correlation coefficients among the various outcome scales were as expected: whereas general and smoking-specific media literacy correlated with each other ($r = .60, p < .001$), they were each inversely correlated with smoking attitudes (ML $r = -.24, p < .001$; SML $r = -.12, p = .11$). These inverse correlations between media literacy and pro-smoking attitudes intensified after the curriculum (ML $r = -.30, p < .001$; SML $r = -.31, p < .001$).

Outcome Analyses

In order to evaluate whether participants would exhibit higher Smoking Media Literacy (SML) and higher General Media Literacy (GML) after the intervention compared to baseline, we conducted paired T-tests to assess changes in these constructs over time. In addition, to assess the clinical significance (as opposed to statistical significance) of these changes, we computed effect sizes, which we defined using Cohen’s d , equal to the difference in mean scale values divided by the pooled variance of the pre- and post-test scores. We used paired T-tests to assess whether there was an increase in pro-smoking attitudes after the intervention compared with before the intervention. In order to assess whether our intervention would be acceptable to adolescents across multiple schools in a region, we tabulated responses to post-test evaluative ATI items.

Finally, we conducted exploratory analyses. These included T-tests comparing each of the individual media literacy and attitude items—as well as subscales representing each of the media literacy domains—over time.

Mean scores for total smoking media literacy increased from 2.99 to 3.22 on a five-point scale over the course of the intervention ($d = 0.44$, $P < .001$), supporting the assumption behind research question 1 (Table 4). Total general media literacy scores increased significantly during this period as well, from 3.11 to 3.26 ($d = 0.38$, $P < .001$), supporting the second research question (Table 4). With respect to the third questions, pro-smoking attitudes (Table 4) increased significantly from 1.23 to 1.36 over the course of the intervention ($d = 0.29$, $P < .001$). Individual score changes on this scale are detailed in Table 6.

Student Impressions of Program

For the fourth research question, the program was judged by the students to be highly acceptable. After the program, more than 80% of students reported enjoying the program and indicated willingness to recommend the program to a friend (Table 5). Additionally, 85.9% reported being active participants in the program lessons, and over 85% of the students agreed that the program would be effective in reducing smoking among youth (Table 7).

Discussion

Past research on school-based tobacco-use prevention efforts has not been encouraging (Peterson et al. 2000; Wiehe et al. 2005). However, the recent finding that media literacy related to tobacco use is strongly associated with both reduced adolescent smoking and reduced susceptibility to future smoking (Primack and Hobbs 2009; Primack, et al. 2006) opens a promising avenue for development of more efficacious school-based programming. Our effort focused on combining the best of previous tobacco education with an integrated focus on media literacy, all in the context of core curriculum education.

The study's main finding that both general and tobacco-specific media literacy increased during the intervention provides initial confirmation of the program's potential to buffer the negative impact of pro-tobacco mass media messages on adolescent smoking. Because the study design precludes a cause-effect relationship from being definitively established, it is possible that the increase would have occurred even without the intervention, but this is unlikely since previous research suggests that media literacy does not generally increase over time. Thus, this is an important and promising result that suggests the need for continued research along these lines. The study also supported the

validity and reliability of the two measures of media literacy. Given their recent development and limited use in previous research, the fact that they demonstrated good psychometric properties is valuable to note (Primack, Gold, Switzer, et al. 2006).

The results suggested that the students' pro-smoking attitudes increased from pretest to posttest. These findings raise the question of whether a 'boomerang' effect was obtained. Byrne and Hart (2009) note that in many cases, exposure to a treatment has an opposite effect from the intended outcome, such as when students exposed to an anti-violence media literacy intervention exhibited higher aggression levels compared to those not exposed (Byrne 2009). Thus, one possible explanation for our results is that exposure to the anti-tobacco curriculum increased pro-smoking attitudes despite its intended goal of making students less susceptible to tobacco use, which would mitigate the claim of program efficacy.

There are several reasons to reject that conclusion, however. Discussion of smoking, even when it focuses on negative aspects, typically engenders some additional interest in the topic that has been shown to be temporary in other studies (Wiehe et al. 2005; Peterson et al. 2000).

Additionally, adolescents of this age normally exhibit an increase in their pro-smoking attitudes due to heavy exposure to media and other influences (Pierce et al. 1998; Wiehe et al. 2005). The increase in pro-smoking attitudes we measured may have been a function of natural maturation among study participants, who were at an age when young people are emotionally and physically negotiating their way through puberty while experimenting with independence and risk (Dryfoos and Quinn 2005; Fetro, Coyle, and Pham 2001). During this developmental period, attitudes towards smoking tend to get more positive (Institute 2008), so the increase we measured may actually have been smaller than it would have been without an intervention.

Another possible explanation for the increase in pro-smoking attitudes is found in a study of the "desirability paradox" (Austin, Pinkleton, and Funabiki-Patterson 2007) found in a sample of students who had received media literacy lessons related to tobacco use. In several instances of media literacy interventions, these authors have noted an increase in positive affect towards media portrayals at the same time they also measured a decrease in beliefs and expectancies associated with a risky behavior (Pinkleton et al. 2008). For example, participants in an anti-tobacco interven-

tion reported finding characters in tobacco advertising more fun and popular than those in a control group, but this is believed to be the result of greater awareness of the techniques advertisers use to make their products appear desirable. Moreover, this increase in affect was not associated with a corresponding increase in beliefs that predict tobacco use for those in the treatment group (Pinkleton et al. 2007). Thus, participants in the present study whose pro-smoking beliefs increased may have been reflecting greater awareness of the intended messages in pro-tobacco messages, while the intervention also increased their logical decision-making skills in a way that decreases the likelihood of tobacco use, as indicated in the increases we report in general and smoking media literacy. Some of our results may also have been a statistical artifact of a floor effect (Russo 2003), with the initial mean for pro-smoking attitudes (1.23) very close to the scale's lowest possible value (1 on a scale of 1-4).

Future research can confirm our interpretation by including a control group, by directly assessing smoking behavior, and by including a longitudinal follow-up investigation. For pragmatic reasons, none of these elements were included in the current investigation. Clearly, attention to these research design and variable issues would strengthen future research efforts.

Our results not only establish this program's potential to increase media literacy, they also speak to the success of its design and content. After all, a program is of limited use if it is not popular with or implemented by educators. We hoped to enhance teacher acceptance and use of the program by tethering the curriculum to Missouri Education Standards and Grade Level Expectations (DESE 2008), and results from the various forms of feedback provided by teachers indicate that this was successful. This suggests that media literacy can be successfully interwoven into existing curricular standards rather than coming across as an additional subject area that competes with what must already be taught.

At the same time, the present study's use of a flexible curriculum that each school tailored to meet its own scheduling, curricular, organizational, and teaching needs appears to have been a key asset from an implementation standpoint. However, from a research standpoint, this raises problems of interpretation. While every team of teachers was provided the same materials, training, and coaching, and results indicate that at least 90% of the lessons were delivered at all

schools, quality of program delivery was not assessed. Additionally, the intervention was multifaceted, with our initial assessment testing just one aspect of the program – the foundational curriculum. Future research will be needed to more closely examine variance in how teachers and schools implement the program, as well as to test the various program components independently. And while results indicate that the program was popular with students, more in-depth measurement of their attitudes and opinions about it will serve as a meaningful element of further evaluation.

In conclusion, the present study supports the utility of including a strong focus on media literacy in middle school tobacco prevention efforts. The study provides evidence that integrating media literacy into tobacco education can have a valuable impact on students' general and smoking-specific media literacy, and that this can be done in a flexible, well-received way. Given the pervasiveness of pro-tobacco messages in the media, and the importance of media in the lives of young adolescents, this increased media literacy may be a key to decreasing the allure of tobacco, and potentially other public health issues.

References

- Altman, David G., Douglas W Levine, Remy Coeytaux, John Slade, and Robert Jaffe. 1996. "Tobacco Promotion and Susceptibility to Tobacco Use Among Adolescents Aged 12 through 17 Years in a Nationally Representative Sample." *American Journal of Public Health* 86 (11): 1590-1593.
- Association for Supervision and Curriculum Development. 2009. Lexicon of Learning. <http://www.ascd.org/Publications/Lexicon-of-Learning/Lexicon-of-Learning.aspx>
- Aufderheide, Patricia, and Charles Firestone. 1995. *Media Literacy: A Report of the National Leadership Conference on Media Literacy*. Aspen Institute.
- Austin, Erica Weintraub, Bruce E. Pinkleton, Stacey J. Hust, and Marilyn Cohen. "Evaluation of an American Legacy Foundation/Washington State Department Of Health Media Literacy Pilot Study." *Health Communication* 18 (1): 175-95.
- Austin, Erin Weintraub, Bruce E. Pinkleton, and Ruth Patterson Funabiki. 2007. "The Desirability Paradox in the Effects of Media Literacy Training." *Communication Research* 34 (5): 483-506.
- Buckingham, David. 2003. *Media Education: Literacy, Learning, and Contemporary Culture*. Cambridge, UK: Polity Press.
- Byrne, Sahara. 2009. "Media Literacy Interventions: What Makes Them Boom or Boomerang?" *Communication Education* 58: 1-14.
- Byrne, Sahara and P. Sol Hart. 2009. "The Boomerang Effect: A Synthesis of Findings and a Preliminary Theoretical Framework." In *Communication Yearbook 33*, edited by C. Beck, 3-37. Mahwah, NJ: Lawrence Erlbaum Associates.
- Centers for Disease Control and Prevention. 2004. "Cigarette Smoking Among Adults: United States." *Morbidity and Mortality Weekly Report* 54 (44): 1121-47.
- . 2009. "Guidelines for School Health Programs to Prevent Tobacco Use and Addiction. Centers for Disease Control and Prevention (U.S.)." *Journal of School Health* 64 (9): 353-60.
- Charlesworth, Annemarie and Stanton A. Glantz. 2005. "Smoking in the Movies Increases Adolescent Smoking: a Review." *Pediatrics* 116 (6): 1516-28.
- Committee on Public Education. 1999. "Media education. American Academy of Pediatrics. Committee on Public Education." *Pediatrics* 104 (2): 341-3.
- Dalton, Madeline A., James D. Sargent, Michael L. Beach, L. Titus-Ernstoff, Jennifer J. Gibson, M. Bridget Ahrens, Jennifer J. Tickle, and Todd F. Heatherton. 2003. "Effect of Viewing Smoking in Movies on Adolescent Smoking Initiation: a Cohort Study." *Lancet*, 362 (9380): 281-5.
- DiClemente, Ralph J., John S. Santelli, and Richard A. Crosby, eds. 2009. *Adolescent Health: Understanding and Preventing Risk Behaviors*. San Francisco: Jossey-Bass.
- DiFranza, Joseph R., Robert J. Wellman, James D. Sargent, Michael Weitzman, Bethany J. Hipple, and Jonathan P. Winickoff. 2006. "Tobacco Promotion and the Initiation of Tobacco Use: Assessing the Evidence for Causality." *Pediatrics* 117 (6): 1237-48.
- Dryfoos, Joy, and Jane Quinn. 2007. *Community Schools: A Strategy for Integrating Youth Development and School Reform*, Number 107: New Directions for Youth Development. San Francisco: Jossey-Bass.
- Eaton, Danice K., Laura Kann, Steve Kinchen, James Ross, Joseph Hawkins, William A. Harris, Richard Lowry, Tim McManus, David Chyen, Shari Shanklin, Connie Lim, Jo Anne Grunbaum, and Howell Wechsler. 2006. "Youth Risk Behavior Surveillance--United States." *Journal of School Health* 76 (7): 353-372.
- Elders, M. Joycelyn, Cheryl L. Perry, Michael P. Eriksen, and Gary A. Giovino. 1994. "The Report of the Surgeon General: Preventing Tobacco Use among Young People." *American Journal of Public Health* 84 (4): 543-547.
- Escobedo, Luis G., and Stephen E. Marcus, Deborah Holtzman, and Gary A. Giovino. 1993. "Sports Participation, Age at Smoking Initiation, and the Risk of Smoking Among US High School Students." *JAMA: Journal of the American Medical Association* 269 (11): 1391-5.
- Farrelly, Matthew C., Kevin C. Davis, M. Lyndon Haviland, Peter Messeri, and Cheryl G. Healton. 2005. "Evidence of a Dose--Response Relationship Between 'Truth' Antismoking Ads and Youth Smoking Prevalence." *American Journal of Public Health* 95 (3): 425-431.

- Farrelly, Matthew C., Cheryl G. Healton, Kevin C. Davis, Peter Messeri, James C. Hersey, and M. Lyndon Haviland. 2002. "Getting to the Truth: Evaluating National Tobacco Countermarketing Campaigns." *American Journal of Public Health* 92 (6): 901-7.
- Fetro, Joyce V., Kim K. Coyle, and Phong Pham. 2001. "Health-risk Behaviors Among Middle school Students in a Large Majority-Minority School District." *Journal of School Health* 71 (1): 30-7.
- Flay, Brian R. 2009. "School-based Smoking Prevention Programs with the Promise of Long-term Effects." *Tobacco Induced Diseases* 5: 6. doi:10.1186/1617-9625-5-6
- Glantz, Stanton A. 2002. "Rate Movies with Smoking 'R.'" *Effective Clinical Practice* 5 (1): 31-34.
- . 2005. "What Should We Do?" *Journal of Adolescent Health* 36 (3):157-159.
- Hicks, Jeff J. 2001. "The Strategy Behind Florida's "Truth" Campaign." *Tobacco Control* 10 (1): 3-5.
- Institute of Medicine. 1997. *Ending the Tobacco Problem: A Blueprint for the Nation*. Washington, DC: National Academies of Science.
- . 2001. *Clearing the Smoke: The Science Base for Tobacco Harm Reduction*. Washington, DC: Institute of Medicine.
- Kaestle, Christine Elizabeth, and Bradford B. Wiles. 2009. "Targeting High-Risk Neighborhoods for Tobacco Prevention Education in Schools." *American Journal of Public Health* 100(9): 1708-13. doi: 10.2105/AJPH.2008.145557
- Lantz, Paula M., Peter D. Jacobson, Kenneth E. Warner, Jeffrey Wasserman, Harold A. Pollack, Julie Berson, and Alexis Ahlstrom. 2000. "Investing in Youth Tobacco Control: A Review of Smoking Prevention and Control Strategies." *Tobacco Control* 9 (1): 47-63.
- Loomis, Brett R., Matthew C. Farrelly, James M. Nonnemaker, and Nathan H. Mann. 2006. "Point of Purchase Cigarette Promotions Before and After the Master Settlement Agreement: Exploring Retail Scanner Data." *Tobacco Control* 15 (2): 140-2.
- Mokdad, Ali H., James S. Marks, Donna F. Stroup, and Julie L. Gerberding. 2004. "Actual Causes of Death in the United States, 2000." *Journal of the American Medical Association* 291(10): 1238-1245. doi: 10.1001/jama.291.10.1238
- National Cancer Institute. 2008. *The Role of Media in Promoting and Reducing Tobacco Use. Tobacco Control Monograph*, vol. 19. Bethesda: U. S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute.
- Office of National Drug Control Policy. 2001. *Helping Youth Navigate the Media Age: A New Approach to Drug Prevention*. Washington, DC: Office of National Drug Control Policy.
- Peterson, Arthur V., Jr. and Kathleen A. Kealey. 2000. "Hutchinson Smoking Prevention Project: Long-term Randomized Trial in School-based Tobacco Use Prevention--Results on Smoking." *Journal of the National Cancer Institute* 92 (24):1979-91.
- Pierce, Jon P., Won S. Choi, 1998. "Promotion of Cigarettes and Adolescent Smoking." *Journal of American Medical Association* 279 (7): 511-15.
- Pinkleton, Bruce E., Erica Weintraub M. Cohen Austin, A. Miller, and Erin Fitzgerald. "A Statewide Evaluation of the Effectiveness of Media Literacy Training to Prevent Tobacco Use Among Adolescents." *Health Communication* 21(1): 23-34.
- Pinkleton, Bruce, E., Erica Weintraub, Marilyn Cohen Austin, Yi-Chun "Yvonne" Chen, Erin Fitzgerald. 2008. "Effects of a Peer-led Media Literacy Curriculum on Adolescents' Knowledge and Attitudes Towards Sexual Behavior and Media Portrayals of Sex." *Health Communication* 23(5): 462-72.
- Primack, Brian A., Melanie A. Gold, Stephanie R. Land, and Michael J. Fine. 2006. "Association of Cigarette Smoking and Media Literacy about Smoking Among Adolescents." *Journal of Adolescent Health* 39 (4): 465-72.
- Primack, Brian A., Melanie A. Gold, Galen E. Switzer, Renee Hobbs, Stephanie R. Land, and Michael J. Fine. 2006. "Development and Validation of a Smoking Media Literacy Scale for Adolescents." *Archives of Pediatric Adolescent Medicine*, 160 (4): 369-74.
- Primack, Brian A., and Renee Hobbs. 2009. "Association of Various Components of Media Literacy and Adolescent Smoking." *American Journal of Health Behavior* 33 (2): 192-201.
- Roberts, Donald F., Lisa Henriksen, Peter G. Christenson, Elizabeth Bandy. 1999. *Substance Use in Popular Movies and Music*. Washington, DC: Office of National Drug Control Policy.

- Russo, Ricardo. 2003. *Statistics for the Behavioral Sciences*. New York: Psychology Press.
- Sargent, James D., Michael L. Beach, Anna M. Adachi-Mejia, Jennifer J. Gibson, Linda T. Titus-Ernstoff, Charles P. Carusi, Susan D. Swain, Todd F. Heatherton, and Madeline A. Dalton. 2005. "Exposure to Movie Smoking: Its Relation to Smoking Initiation among US Adolescents." *Pediatrics* 116 (5): 1183-91.
- Sargent, James D., Michael L. Beach, Madeline A. Dalton, Linda T. Titus-Ernstoff, Jennifer J. Gibson, Jennifer J. Tickle, and Todd F. Heatherton. 2004. "Effect of parental R-rated movie restriction on adolescent smoking initiation: a prospective study." *Pediatrics* 114 (1):149-56.
- Sloan, Frank A., Carrie A. Mathews, and Justin G. Trogon. 2004. "Impacts of the Master Settlement Agreement on the Tobacco Industry." *Tobacco Control* 13 (4): 356-61.
- Sly, David F., Gary R. Heald, and Sarah Ray. 2001. "The Florida 'Truth' Anti-tobacco Media Evaluation: Design, First Year Results, and Implications for Planning Future State Media Evaluations." *Tobacco Control* 10 (1): 9-15.
- Sly, David F, RS Hopkins, Edward Trapido, and Sarah Ray. 2001. "Influence of a Counter-advertising Media Campaign on Initiation of Smoking: the Florida 'Truth' Campaign." *American Journal of Public Health* 91 (2): 233-238.
- Thoman, Elizabeth. 2003. "Skills and Strategies for Media Education." Center for Media Literacy. <http://www.medialit.org/reading-room/skills-strategies-media-education>
- Wakefield, Melanie, Brian Flay, Mark Nichter, and Gary Giovino. 2003. "Effects of Anti-smoking Advertising on Youth Smoking: a Review." *Journal of Health Communication* 8 (3): 229-47.
- . 2003. "Role of the Media in Influencing Trajectories of Youth Smoking." *Addiction* 98 (Supplement 1): 79-103.
- Wiehe, Sarah E., Michelle M. Garrison, Dimitri A. Christakis, Beth E. Ebel, and Frederick P. Rivara. 2005. "A Systematic Review of School-based Smoking Prevention Trials with Long-term Follow-up." *Journal of Adolescent Health* 36 (3): 162-9.
- Zwarun, Lara. 2006. "Ten Tears and 1 Master Settlement Later: The Nature and Frequency of Alcohol and Tobacco Promotion in Televised Sports, 2000 Through 2002." *American Journal of Public Health* 96 (8): 1492-7.

Table 1: Sample Characteristics

	N (%)
School	
1	23 (11.3)
2	12 (5.9)
3	28 (13.7)
4	49 (24.0)
5	79 (38.7)
6	13 (6.4)
Grade	
6 th	79 (38.7)
7 th	76 (37.3)
8 th	49 (24.0)
Age	
< 11	59 (29.1)
11	70 (34.5)
12 or older	74 (36.5)
Gender	
Male	66 (32.4)
Female	138 (67.7)
Race	
White / European American	154 (76.6)
Black	30 (14.9)
Asian / Hawaiian / Pacific Islander	2 (1.0)
American Indian / Alaskan Native	3 (1.5)
Mixed / Other	12 (6.0)
Ethnicity	
Hispanic	7 (3.6)
Non-Hispanic	189 (96.4)
Maternal Education	
Did not graduate high school	15 (7.7)
Graduated high school but not college	75 (38.7)
Graduated college but no additional education	22 (11.3)
Graduate school or higher	17 (8.8)
Don't know	65 (33.5)

* Used as a surrogate for socioeconomic status

Table 2: Media Literacy Domains and Factors related to Curriculum

Domain	Core Concept	Missouri Educational Standard
Authors & Audiences	AA1: Authors create mass media messages for profit and/or influence.	A. Analyze the source to determine its credibility.
	AA2: Mass media authors target specific audiences.	B. Relevance. b. Analyze information to determine relevance in relationship to the topic.
Meanings & Messages	MM1: Mass media messages have inherent values or points of view.	C. Reliability. c. Analyze for bias by analyzing viewpoints conveyed in source.
	MM2: Different people interpret mass media messages differently.	B. Relevance. b. Synthesize to make meaning (draw a conclusion, formulate a hypothesis, make inferences, etc.)
	MM3: Mass media messages affect attitudes and behaviors.	C. Reliability. c. Evaluate accuracy of information determining whether it contradicts or verifies other sources.
	MM4: Mass media messages are developed using multiple production techniques.	A. Message. Explain media techniques to convey the message.
Reality & Representation	RR1: Mass media messages alter / filter reality	C. Reliability. a. Analyze the sources for credibility.
	RR2: Mass media messages omit information	D. Comprehensiveness. b. Assess for gaps or weaknesses in gathered information and locate additional information as needed.

Table 2 is adapted from B.A. Primack, M.A. Gold, S.R. Land, and M.J. Fine 2006.

Table 3: Lesson Plan Descriptions and Related Media Literacy Factors

Lesson Plans	
Lesson 1 - This lesson raises awareness about the amount and types of media students use and introduces the 8 Core Concepts of Smoking Media Literacy.	AA1, AA2, MM1, MM1, 2, 3, 4, - RR1, RR2
Lesson 2 - The difference between active and passive media consumption is explained and persuasion techniques used to sell products are introduced. Students use a systematic observation tool combined with digital cameras to map the tobacco messages in their community.	AA1, AA2, MM1, MM1, 2, 3, 4, - RR1, RR2
Lesson 3 - Students research the effects tobacco has on living organisms. Students create newsletters to share what they have learned with the school community.	RR1, RR2
Lesson 4 - Students explore the causes and effects of smoking in order to create anti-smoking posters geared towards other students.	AA1, AA2, MM1, MM2, MM3, MM4
Lesson 5 - Students learn the impact the tobacco industry has on the environment. Students learn to storyboard and produce PSAs to share with peers, family, and community members via new media channels including youtube.com and schooltube.org.	RR1, RR2
Lesson 6 - Students explore the impact of smoking in various workplaces.	AA2, MM1, MM2, MM3, RR1, RR2
Lesson 7 - Students participate in a mock legislative process through role-playing they learn about lobbying, front groups, and issue advocacy.	AA2, MM1, MM2, MM3, RR1, RR2
Lesson 8 - In this lesson, students explore how tobacco advertising has evolved over the past sixty years and how they have targeted various groups.	AA1, AA2, MM1, MM3, RR1, RR2
Lesson 9 - By assuming the roles of marketing personnel in a tobacco company, students learn why tobacco companies need to recruit youth as “replacement smokers.”	AA1, AA2, MM1, MM3, MM4, RR 1, RR2
Lesson 10 - Students explore how advertising leverage can lead to censorship of information about public health issues products.	AA1, MM1, MM3, RR1, RR2
Lesson 11 - This lesson shows how tobacco advertising creates a deceptive image of the consequences of smoking. Students will demonstrate an awareness of strategies, an understanding of the gap between ad messages and reality, and how advertisers target different groups.	AA1, AA2, MM2, MM3, RR1
Lesson 12 - This lesson presents the methods advertisers use in selecting magazine ad space. Students act as members of marketing teams with fixed marketing budgets to develop advertising plans for various products, targeting a teen audience.	AA1, RR1
Lesson 13 - In this lesson students calculate the cost of smoking over a period of time and construct graphs to display the data. Also students calculate the amount of money a smoker will spend on cigarettes throughout his/her lifetime.	AA1, AA2, RR2
Lessons 14–18 plus - Project Citizen - These lessons provide the structure for learning about public policy and advocacy. Based on their studies students develop tobacco policy recommendations and media advocacy campaigns and take part in mock legislative hearings.	AA2, MM1, MM2, MM3, RR1, RR2

Table 4: Differences in outcome variables and effect sizes

	T1	T2	d*	P †
Total Smoking Media Literacy (SML)‡	2.99	3.22	0.44	<.001
SML Subscale 1 (Authors/Audiences)	3.27	3.52	0.38	<.001
SML Subscale 2 (Messages/Meanings)	2.79	3.02	0.41	<.001
SML Subscale 3 (Representation/Reality)	3.18	3.40	0.33	<.001
Total General Media Literacy (GML)‡	3.11	3.26	0.38	<.001
GML Subscale 1 (Authors/Audiences)	2.84	2.94	0.14	<.001
GML Subscale 2 (Messages/Meanings)	3.13	3.30	0.35	<.001
GML Subscale 3 (Representation/Reality)	3.25	3.43	0.33	<.001
Total Cigarette Attitudes‡	1.23	1.36	0.29	<.001
Smoking cigarettes is not as bad as everyone makes it out to be	1.26	1.35	0.18	.09
Smoking cigarettes is enjoyable	1.23	1.36	0.24	.01
Smoking helps you deal with problems or stress	1.38	1.58	0.25	.002
Smoking helps you stay thin	1.38	1.59	0.28	.002
There is no harm in having a cigarette once in a while	1.36	1.43	0.10	.23
Smoking helps you feel more comfortable at parties	1.33	1.5	0.24	.007
If you start smoking every day, it is very hard to stop	3.34	3.39	0.01	.63
Smoking makes you look more mature	1.26	1.42	0.23	.01
Smoking makes you look more attractive or sexy	1.21	1.28	0.17	.20

* Cohen's d, which is equal to the difference in means divided by the pooled standard deviations.

† P-values were computed using paired *T*-tests.

‡ Indicates primary outcome.

Table 5 Post-intervention impressions

Item	Mean (SD)*	% Responding Yes
The instructor was knowledgeable	3.50 (0.64)	96.5
I learned a lot during this program	3.37 (0.68)	91.0
I enjoyed this program	3.27 (0.80)	84.9
I would like more programs like this one	3.22 (0.82)	82.3
I would recommend this program to a friend	3.23 (0.79)	84.3
I participated in this program	3.26 (0.83)	85.9
This program kept my attention	3.24 (0.83)	85.9
I am less likely to smoke now that I have seen this program	3.42 (0.89)	85.4
This program would be effective in getting kids not to smoke	3.39 (0.80)	89.3
I will look at smoking differently from now on	3.34 (0.84)	85.4
I will look at advertising differently from now on	3.27 (0.86)	82.2

* 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree