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Media Literacy Education for Elementary School Substance Use Prevention: Study of Media Detective

Janis B. Kupersmidt, PhD[a], **Tracy M. Scull, PhD**[a], and **Erica Weintraub Austin, PhD**[b]

[a]Innovation Research and Training, Durham, North Carolina

[b]Edward R. Murrow College of Communication, Washington State University, Pullman, Washington

Abstract

OBJECTIVES—Media Detective is a 10-lesson elementary school substance use prevention program developed on the basis of the message interpretation processing model designed to increase children's critical thinking skills about media messages and reduce intent to use tobacco and alcohol products. The purpose of this study was to conduct a short-term, randomized, controlled trial to evaluate the effectiveness of Media Detective for achieving these goals.

METHODS—Elementary schools were randomly assigned to conditions to either receive the Media Detective program (n = 344) or serve in a waiting list control group (n = 335).

RESULTS—Boys in the Media Detective group reported significantly less interest in alcohol-branded merchandise than boys in the control group. Also, students who were in the Media Detective group and had used alcohol or tobacco in the past reported significantly less intention to use and more self-efficacy to refuse substances than students who were in the control group and had previously used alcohol or tobacco.

CONCLUSIONS—This evaluation provides evidence that Media Detective can be effective for substance use prevention in elementary school–aged children. Notably, media-related cognitions about alcohol and tobacco products are malleable and relevant to the development and maintenance of substance use behaviors during late childhood. The findings from this study suggest that media literacy– based interventions may serve as both a universal and a targeted prevention program that has potential for assisting elementary school children in making healthier, more informed decisions about use of alcohol and tobacco products.

Keywords

tobacco; alcohol; media literacy education; prevention; elementary school; substance use

Address correspondence to Janis B. Kupersmidt, PhD, Innovation Research and Training, 1415 W NC Highway 54, Suite 121, Durham, NC 27707. jkupersmidt@irtinc.us.

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Substance use rates among elementary school children are lower than rates found in adolescence; nonetheless, ~21% of elementary school–aged children already have experimented with alcohol.[1] This early use in elementary school constitutes a serious public health problem that warrants attention. Young children's perceptions about substance use are still malleable as they enter a period of enhanced decision-making ability, making the elementary school years critical for preventing the use of alcohol and tobacco.[2] Thus, preventive intervention efforts need to begin before fifth grade to prevent the onset and crystallization of positive expectancies about use of unhealthy substances.

School-based substance abuse prevention programs in elementary school consistently have resulted in reductions in substance use and other problem behaviors.[3,4] The most successful interventions have used interactive activities that focused on resistance and social skills. Programs tend to focus on helping students manage negative interpersonal influences on the decision to use substances.[4] In addition to the influence of parents and peers on these decisions, media "super peers"[5] have a meaningful and unique influence on children's use and intent to use substances.[6]

Young children, typically nondrinkers, have primarily negative expectancies about alcohol use[7]; however, research suggests that frequent exposure to pro-substance use messages may accelerate the shift toward the activation of positive and arousing expectancies and away from the activation of negative and sedating expectancies.[8] Perceptions of the desirability of media portrayals of alcohol use have been shown to increase with grade.[9] It could be argued that exposure to protobacco messages would result in similar shifts in tobacco use expectancies.

As hypothesized in the message interpretation process (MIP) model[10] and in the health belief model,[11,12] beliefs and expectancies about risk behaviors are related to attitudes and cognitions about risk behaviors and actual risk behaviors themselves.

Media literacy skills, defined as the ability to access, analyze, evaluate, and produce media in a variety of forms[13] and a desire to act on these abilities in a manner that benefits a healthy and democratic citizenship,[14] can provide part of the foundation for the prevention of substance use. Media literacy interventions can interrupt the progression from negative to positive substance use expectancies by strengthening children's logical responses to media messages and raising their awareness of their own emotional responses. Better critical thinking skills will provide children with a more active filter in which media images are processed, diminishing the relationship between media exposure and subsequent substance use behaviors. Given the pervasiveness and influence of media messages on young people today, educators have argued that the teaching of media literacy skills needs to be integrated into educational objectives to promote healthy and responsible decision-making.[15,16]

Recent research indicates that youth media literacy education programs can help prevent a variety of risky health outcomes, including substance use.[17] As a result, several national health prevention and promotion organizations such as the American Academy of Pediatrics,[18,19] Office of National Drug Control Policy,[20] and US Department of Health and Human Services[21] have advocated for the need for youth media literacy education programs

for the purpose of substance abuse prevention. Media literacy programs have been developed for students in middle and high schools; however, relatively fewer have been developed for the late elementary school years. This leaves an important gap in prevention services given that 9- to 12-year-olds are among the population most vulnerable to first-time substance use, because their attitudes toward use become increasingly positive during this developmental period.[9] Notably, a 1-session media literacy training designed for third-grade children produced both short-term and long-term effects on reducing positive alcohol expectancies, suggesting that these attitudes both are malleable and can be positively affected by intervention.[22] Thus, the goal of this study was to evaluate the effectiveness of a more-comprehensive, theory-based, developmentally appropriate, third- through fifth-grade media literacy education program for substance use prevention.

METHODS

Participants

A pretest–posttest design allowed for the evaluation of program effectiveness in a randomized, controlled trial in 12 elementary schools located in 5 central North Carolina school districts. An a priori power analysis by using a small effect size and power of 0.80 estimated a target total sample size of 788. On the basis of an average consent rate from previous school-based studies of 72%, the goal was to recruit 1095 students for the study. Schools were randomly assigned to the intervention or control group after consenting to participate by using a random-number generator. All third- through fifth-grade teachers in participating schools were invited to participate. In total, 49 classes participated, with 22 in the intervention group and 27 in the control group. Students ranged in age from 7 to 13 (mean: 9.40; SD: 1.14), and 51% were female. The average parental consent rate was 79% for the intervention group and 70% for the control group. Among students who received parental consent, 96% of intervention and 95% of control group students assented to participate. In total, 723 students took the pretest of a sample of 1021 students. Forty-four of the 723 available students who took the pretest did not complete the posttest, leaving 344 students in the intervention group and 335 students in the control group.

Design and Procedure

Participating intervention teachers received a 1-day training session to familiarize them with the curriculum and evaluation protocol. Teachers distributed parent permission forms to students to be signed by parents or guardians. All students in the participating classrooms were eligible to participate in the evaluation. In addition to obtaining parent permission, an assent form was read aloud to the students in class and students were asked to sign the form before distribution of the preintervention questionnaires. Students either who did not have active parent permission or who did not assent to participate did independent reading or homework in the library during data collection. The administration of the questionnaires took ~45 minutes during the school day. Trained project staff members read each question aloud to account for differences in reading abilities. Participating students received a small project-related gift for completing each questionnaire (bookmark and keyring flashlight).

Students in the intervention classrooms received the 10-day media literacy program between pretest and posttest data collection, which was a little more than 2 weeks apart (mean: 16.68 days). Students in the waiting list control group received normal classroom material between collections (mean: 14.92 days). Waiting list control teachers were offered the opportunity to receive Media Detective (MD) training and materials after their participation in the research study.

Primary Outcome Measures: Intentions to Use Alcohol or Tobacco

As the most proximal cognition to predicting substance use,[23–25] intention to use was measured by 8 items on 4-point scales ranging from 0 (I definitely will not) to 3 (I definitely will). Four items asked specifically about alcohol use intentions, and 4 items asked about tobacco use intentions (α = .85).

Secondary Outcome Measures

Deconstruction Skills—Critical thinking about advertisements was measured via students' deconstruction of an alcohol print advertisement on the pretest and posttest coded for product, target audience, purpose, ad hook, hidden message, missing information, and visual elements. Summed scores formed a deconstruction skills score (0 –16). Individual students' scores were taken as an average of each of the 3 trained coders' scores for that individual (α = .94).

Understanding of Persuasive Intent—Recognition of the motives behind the creation of advertisements, an essential step toward media literacy,[22] was assessed with 3 items with response scales ranging from 0 (never) to 5 (always; α = .72).

Interest in Alcohol-Branded Merchandise—A predrinking intention measure assessed interest in alcohol-branded merchandise (eg, towels, glasses, T-shirts, toys), because youth ownership of such items correlates with the initiation of adolescent drinking.[26] Six items measured interest in alcohol-branded merchandise (eg, Corona toy plane) as compared with similar items with a soda product theme (eg, Sprite toy plane).[9,22,27] Students indicated which they liked more, on a 5-point scale, with higher mean scores indicating more interest in alcohol-branded merchandise (α = .83).

Self-efficacy—Four items assessed students' feelings of personal control to refuse substances, which has been shown to be an outcome of media literacy education and a predictor of substance use.[28,29] Response scales ranged from 0 (never) to 5 (always), with higher mean scores indicating greater self-efficacy (α =.78).

Dosage and Fidelity of Implementation Measures

Dosage of the program received was assessed by attendance scores for each lesson. Scores ranged from 3 to 10 days of attendance. Teachers reported how thoroughly they had taught each topic of each lesson (0 = "not at all" to 3 = "thoroughly") as a measure of fidelity of implementation. Ratings of topic completion were summed across the total number of topics (0 to a maximum score of 141). Observers completed fidelity ratings for 20% of each participating teacher's lessons.

Media Detective (MD) Program

The MD program is a theory- and evidence-based, developmentally sensitive, esthetically appealing, easy-to-teach, media literacy education, substance use prevention program. The MIP model,[10] used in the design and development of the MD program, draws from social cognitive theory,[30] dual-process theories of attitude change, and the theory of reasoned action[31] to demonstrate how individuals make use of media messages in their decision-making about topics such as substance use. According to the MIP model, individuals apply both emotion-and logic-based processing to media messages. Messages that seem attractive, realistic, and similar to the viewer and his or her experiences are more likely to influence decisions in ways that are consistent with the message content. For example, if a message about alcohol or tobacco use makes the use seem “cool” or powerful or if the message is perceived as realistic or similar to the viewer, then the message will be more likely to influence the viewer to use the substance. A strong emotional response to a message can bias or bypass logic-based thinking, making it important to teach children to challenge the mystique of positive or glamorous commercial messages for tobacco and alcohol products.

The MD program has 10 lessons of ~45 minutes each that build cumulatively on one another. Each lesson is scripted in a professionally graphically designed teacher manual to facilitate implementation fidelity. MD uses a detective theme to engage students’ interest and impart critical thinking skills. Students learn to look for 5 “clues” when they view an advertisement: (1) the product being sold; (2) the target audience the advertisers are trying to attract; (3) the ad hook used to attract attention; (4) the hidden message, or what the ad is suggesting will happen if you use the product; and (5) the missing information about health consequences from using the product. Students apply these skills first to deconstructing print advertisements for a wide variety of products and later for alcohol and tobacco products. The delayed introduction to alcohol and tobacco ads was consciously designed to try to prevent reactance against a program that is too overtly positioned as a substance abuse prevention program.

Students are encouraged to recognize the benefits of becoming active rather than passive viewers of media. The curriculum culminates in an individual media advocacy activity that involves the creation of a counter-ad. Consistent with the MIP model, the activities were focused on decreasing children’s perceptions of the realism and similarity of alcohol and tobacco advertising messages compared with people and things that they know, with the goal of reducing their interest in the purchase or use of these products.

RESULTS

Overview of Analyses

Preliminary analyses examined whether the randomization of schools produced approximately equal samples. Each outcome variable was assessed using SAS PROC MIXED, which accounts for within-classroom heterogeneity, with teacher serving as the repeated variable. Pretest scores for each outcome variable were included as predictor variables; therefore, outcome variable means are reported as adjusted posttest scores. Hierarchical linear model (ie, intention-to-treat) analyses were used to investigate

differences in students' primary and secondary outcome measures by using condition (intervention/control), grade (third, fourth, fifth), gender (male/female), previous use (user/nonuser), grade by condition, gender by condition, and previous use by condition as independent variables. Dosage and fidelity of implementation measures were examined as moderators of effectiveness.

Test of Randomization Effectiveness

The control and intervention groups were compared on key demographic variables (gender, grade, previous use of alcohol and tobacco) for group equivalence as shown in Table 1. The sample included approximately equal numbers of boys and girls; more third-grade students than fourth- or fifth-grade students. Approximately 18% of students had tried alcohol or tobacco. Control and intervention groups did not differ from one another in terms of gender and previous experience with alcohol and tobacco, according to χ^2 analyses. The intervention group consisted of a larger proportion of fifth-graders, whereas the control group consisted of a larger proportion of third-graders ($\chi^2 = 32.24$, $P < .001$).

Outcome Analyses

Results of significant findings for main effects and interactions involving the intervention condition can be found in Table 2, including group means, SDs, and F test results. No adverse events were observed.

Deconstruction Skills—There was a significant difference in students' posttest deconstruction skills, with students in the intervention group better able to deconstruct advertisements than students in the control group. There was a main effect for grade ($F_{2,43} = 7.24$, $P < .005$). Fifth-grade students (mean: 5.90; SE: 0.16) were better able to deconstruct advertisements than were third-grade students (mean: 5.14; SE: 0.14; $t = -3.76$, $P < .001$) and fourth-grade students (mean: 5.31; SE: 0.18; $t = -2.53$, $P < .05$). There was a main effect for previous use of alcohol and tobacco($F_{1,43} = 5.64$, $P<.05$). Students who had never used alcohol or tobacco (mean: 5.65; SE: 0.09) were better able to deconstruct advertisements than were students who had used these substances before (mean: 5.24; SE: 0 .17).

Understanding of Persuasive Intent—There was a significant difference in students' posttest understanding of persuasive intent, with students in the intervention group better able to understand persuasive intent than students in the control group. There was a main effect for grade ($F_{2,43} = 3.49$, $P< .05$). Fifth-grade students (mean: 3.91; SE: 0.11) were better able to understand persuasive intent than were third-grade students (mean: 3.57; SE: 0.09; $t = -2.59$, $P < .05$).

Interest in Alcohol-Branded Merchandise—There was a significant difference in students' posttest interest in alcohol-branded merchandise as a function of their previous use of alcohol and tobacco ($F_{1,35} = 19.71$, $P < .0001$). Students who had never used alcohol or tobacco products (mean: 1.56; SE: 0.03) were less interested in alcohol-branded merchandise than were students who had used before (mean: 1.82; SE: 0.06). Also, boys in the intervention group were less interested in alcohol-branded merchandise than were boys in the control group and girls in the intervention or control groups.

Intentions to Use Alcohol and Tobacco—There was a significant difference in students' posttest intentions as a function of their previous use of alcohol and tobacco ($F_{1,33} = 64.64$, $P<.0001$). Students who had never used alcohol or tobacco (mean: 0.14; SE: 0.01) were less likely to report intentions to use alcohol or tobacco in the future than were students who had used alcohol or tobacco before (mean: 0.35; SE: 0.02). Furthermore, students who were in the intervention group and had used before were less likely to report intentions to use alcohol or tobacco in the future than were students who were in the control group and had used before. There were no differences between the intervention and control groups among students who had not tried alcohol or tobacco in the past.

Self-efficacy—There was a significant difference in students' posttest self-efficacy to refuse alcohol and tobacco, with students in the intervention group reporting higher self-efficacy than students in the control group. In addition, there was a main effect of previous use of alcohol and tobacco ($F_{1,32} = 24.80$, $P<.0001$). Students who had never used alcohol or tobacco (mean: 4.87; SE: 0.02) reported higher levels of self-efficacy to refuse alcohol and tobacco than were students who had used alcohol and tobacco before (mean: 4.61; SE: 0.05). Furthermore, there was an interaction of previous use and intervention. Students who were in the intervention group and had used before reported higher levels of self-efficacy to refuse alcohol and tobacco than were students who were in the control group and had used before. There were no differences between the intervention and control groups among students who had not experimented with alcohol or tobacco; both groups reported high levels of self-efficacy.

Dosage and Fidelity of Implementation Analyses

Dosage and implementation differences were examined as moderators of the effectiveness of the intervention. Of 344 student participants in the intervention group, 235 (68%) attended all scheduled lessons, 69 (20%) missed 1 lesson, 27 (8%) missed 2 lessons, 8 (2%) missed 3 lessons, and 5 (2%) missed ≥4 lessons. This dosage variable has a restricted range and is heavily skewed, which limits our ability to examine dosage effects; therefore, these analyses focused mainly on fidelity of implementation across intervention teachers. On the days of observations, teachers self-reported that they taught 98% of the subtopics listed for the lessons, on average, whereas observers reported 93%, on average. For examination of the effect of program implementation on student outcomes, an intraclass correlation coefficient was calculated for each primary outcome measure using teacher as the nested variable. Overall, the intraclass correlation coefficients were low (deconstruction = 0.05; understanding of persuasive intent = 0.04; interest in alcohol-branded merchandise = 0.04; intentions to use alcohol and tobacco = −0.02; and self-efficacy = −0.02), which suggests that changes in the primary child outcome variables were not likely attributable to teacher differences in implementing the program.

DISCUSSION

This study evaluated a theory-based, developmentally appropriate, interactive, relatively brief media literacy program for elementary school students for substance abuse prevention. Results indicate that the MD program, based on the MIP model,[10] is effective for increasing

media literacy skills and for preventing substance use in elementary school students. As compared with the students in the control group, students who received the program were better able to deconstruct advertisements and had a better understanding of the persuasive intent of advertising. Boys who participated in the program showed decreased interest in alcohol-branded merchandise. In addition, participating students who had experimented with alcohol or tobacco had decreased intentions to use alcohol and tobacco in the future and increased self-efficacy to refuse alcohol and tobacco products. Furthermore, results suggest high levels of teacher fidelity in teaching the program and high levels of student and teacher satisfaction with the program. Thus, MD was effective as both a universal prevention program for elementary students who had not tried substances and a targeted preventive intervention for elementary students who had experimented with substances and were at risk.

That the MD intervention affected deconstruction skills is an important manipulation check to demonstrate that students learned and exhibited new skills from the program. Decades of campaign evaluations have shown, however, that changing knowledge does not necessarily change behaviors. It is important that the MD evaluation included theory-based outcome measures in addition to measuring knowledge gain and affinity for the curriculum. Future research efforts should include replication of these findings by using a larger sample of schools, which may reveal additional main effects for the intervention. Future implementation research could be designed to investigate dosage effects on media literacy education by using random assignment to conditions that vary in number of lessons. Finally, this line of research would benefit greatly from a longer term follow-up period to examine whether the short-term immediate effects of MD are sustained and whether participation in MD results in the prevention or reduction of actual substance use behaviors.

CONCLUSIONS

These findings underscore the value of teaching media literacy skills to elementary school–aged children both before and after early experimentation with alcohol and tobacco. Even after participating in only a 2-week school-based curriculum, critical thinking skills, intentions to use, and self-efficacy to refuse use were enhanced. These findings suggest that theory-based media literacy education interventions comprise an effective approach for substance use prevention.

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ABBREVIATIONS

MIP	message information processing
MD	Media Detective

WHAT'S KNOWN ON THIS SUBJECT

Media literacy education is a promising form of preventive intervention for reduction of risky health behaviors.

WHAT THIS STUDY ADDS

This study adds the results of the first randomized, controlled trial of a school-based, theory-driven media literacy education program for elementary school–aged students for the prevention of alcohol and tobacco use.

TABLE 1

Frequencies, Percentages, and *P* Values from χ^2 Analyses of Participant Demographic and Background Characteristics by Condition

Demographic Variable	Condition, *n* (%)		*N* (%)	*P*
	Control	Intervention		
Male gender	156 (47)	179 (52)	335 (49)	.1400
Grade				.0001
Third	177 (52)	136 (40)	313 (46)	
Fourth	79 (24)	56 (16)	135 (20)	
Fifth	79 (24)	152 (44)	231 (34)	
Previous use of alcohol or tobacco, yes	60 (18)	62 (18)	122 (18)	.9700

TABLE 2

Adjusted Posttest Mean Scores on Child Outcome Variables

Measure	Intervention		Control		*df*	F
	Mean	SE	Mean	SE		
Deconstruction skills	6.31[a]	0.14	4.59[b]	0.15	1,43	70.60[c]
Understanding of persuasive intent	3.92[a]	0.10	3.58[b]	0.11	1,43	5.52[d]
Interest in alcohol-branded merchandise, condition by gender					1,47	6.12[d]
Boys	1.56[b]	0.05	1.76[a]	0.06		
Girls	1.70[a]	0.06	1.73[a]	0.06		
Intentions to use alcohol and tobacco, condition by previous use					1,33	5.41[d]
Never used	0.14[c]	0.01	0.13[c]	0.01		
Previous use	0.30[b]	0.03	0.41[a]	0.04		
Self-efficacy						
Condition	4.79[a]	0.03	4.69[b]	0.04	1,43	4.32[d]
Condition by previous use					1,32	6.13[d]
Never used	4.86[a]	0.03	4.88[a]	0.02		
Previous use	4.73[b]	0.06	4.50[c]	0.07		

Means within a row with different superscript letters ([a, b, c]) are significantly different from one another.

df indicates degrees of freedom.

[c] $P < .0001$.

[d] $P < .05$.

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