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## The effectiveness of online, family-based media literacy education for substance abuse prevention in elementary school children: Study of the Media Detective Family program

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### Abstract

The present study investigates the effectiveness of a family-based, online media literacy education (MLE) program for substance abuse prevention in children from rural areas. A total of 83 families were randomly assigned to receive *Media Detective Family (MDF)* ( $n = 47$ ) or a control computer program ( $n = 36$ ) between pre- and posttest questionnaires. Fifty-one percent ( $N=42$ ) completed a three-month follow-up questionnaire. Children receiving *MDF* reported a significant reduction in their use of substances over time compared to children in the control group ( $d = -.80$ ). Parents receiving *MDF* reported that the program was convenient and engaging. The current study showed that an online substance use prevention program using MLE and designed for families is an effective intervention method for reducing children's substance use.

### Keywords

tobacco; alcohol; media literacy education; prevention; parents

### Introduction

Although substance use in elementary school is uncommon, early onset is associated with serious long-term consequences such as problem drinking (Gruber, DiClemente, Anderson, & Lodico, 1996), adult alcohol use disorders (DeWit, Adlaf, Offord, & Ogborne, 2000), and abnormal brain development (HHS, 2014). In addition, children develop attitudes about substance use through interactions with their environment which may influence later

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decisions about experimenting with alcohol and tobacco products (Miller, Smith, & Goldman, 1990). Thus, the elementary school years constitute a critical time for prevention efforts, as there is potential to reach children as they are developing attitudes about their own substance use and the use of others, as well as to reach high-risk children who have already begun experimenting with substances.

Media messages can influence youth decisions to use substances. The association between youth exposure to pro-substance use media messages and youth substance use experimentation is well-documented (Strasburger & Donnerstein, 1999). In fact, media-related cognitions add to the prediction of substance use above and beyond the well-known influence of parent and peers during both childhood and adolescence (Scull, Kupersmidt, Parker, Elmore, & Benson, 2010; Scull, Kupersmidt, & Erasquin, 2014). Unfortunately, youth are frequently exposed to advertisements for alcohol and tobacco in movies, television, and music lyrics (Goldstein, Sobel, & Newman, 1999; Christenson, Henriksen, & Roberts, 2000; Primack, Dalton, Carroll, Agarwal, & Fine, 2008). Early prevention efforts need to address this pervasive and persuasive influence of advertising on substance use decision-making. One approach is to help children become more adept at processing media messages, especially those that normalize the ubiquitous use of substances, glamorize excessive substance use, and depict consequence-free substance use.

Media literacy education (MLE) programs are designed to strengthen children's logical responses to media messages and make youth more aware of their emotional responses to the media. Many MLE programs are based upon the Message Interpretation Process (MIP) model (Austin, 2007) and the Health Belief model (Bush & Iannotti, 1990; Janz & Becker, 1984) that hypothesize that beliefs and expectancies about risk behaviors shape and motivate both the intent to use and actual use of substances. By developing critical thinking skills, children will have a more active filter through which media messages can be processed to help them directly analyze the beliefs and expectations that are being shaped and reinforced by these messages. Thus, this eventually changes the relationship between media exposure and subsequent substance use behaviors.

In fact, enhanced critical thinking about media messages and improved media deconstruction skills that have been taught and practiced in school-based curricula have been found to be negatively related to substance use outcomes across childhood and adolescence (Austin & Johnson, 1997; DeBenedittis, Loughery, McCannon, & Goldborough, 2000). More specifically, the *Media Detective* program, group-based MLE substance abuse prevention program implemented with elementary school students, was found to reduce intentions to use both alcohol and tobacco in the future; increase media-related critical thinking; reduce boys' interest in alcohol-branded merchandise; and increase self-efficacy to refuse substance use in the future, for students who had previously used one or the other substance (Authors, 2010). Furthermore, in another MLE RCT conducted with middle school students, increases in media-related critical thinking skills significantly mediated change in substance use outcomes (Kupersmidt, Scull, & Benson, 2012). Taken together, these studies suggest that since MLE substance abuse prevention programs have been rigorously evaluated and the positive impact has been replicated across multiple age groups,

teaching these skills should be considered a fundamental component of a comprehensive school-based health education system.

Interventions involving parents can complement effective school-based prevention programs. Parents can help to reduce the risk of substance use through increasing parent-child communication; monitoring their children's behaviors; use of positive norms and expectations about abstaining from substance use; and modeling healthy behaviors (e.g., Harakeh, Scholte, Vermulst, deVries, & Engels, 2004; Kodl & Mermelstein, 2004; Simons-Morton & Haynie, 2003; Stigler, Perry, Komro, Cudeck, & Williams, 2006). Given these successful outcomes, it is logical to consider that children might also benefit from participation in an MLE program that teaches both parents and youth critical thinking skills. In this way, parents can help their children better interpret media messages about substances and parents can learn to help their children apply these skills at home.

Underage tobacco and alcohol use is a particular problem for rural communities. Studies have shown that in comparison with urban youth, substance use rates are higher among rural youth (CA: A Cancer Journal for Clinician, 2002; Maine Rural Health Research Center, 2007) as compared to urban or suburban youth. Unfortunately, physical, social, and economic barriers related to living in remote rural areas, such as stigma and distance, hinder family engagement in substance abuse prevention programs that require participation in-person (Levant, 1987; Spoth & Redmond, 1993). The presence of these challenges require the development and evaluation of innovative solutions to address the need for effective substance abuse intervention programs in rural parts of the U.S.

Mobile delivery of health programming (mHealth) can increase the consistency and accuracy of content, decrease embarrassment or stigma associated with traditional forms of prevention programming, and enhance relevance and engagement through interactive features and self-paced functionality. Internet access is no longer a barrier for web-based prevention strategies, as 78% of residents living in rural communities report having Internet access, which is comparable to the rates for residents in both suburban and urban communities (85%; Perrin & Duggan, 2015). Therefore, the power of mobile and web-based technologies can be harnessed to positively impact the health of hard-to-reach populations.

The *Media Detective Family (MDF)* program is a web-based MLE substance abuse prevention program designed to be completed by parents and their children together. The goals of the program are to enhance the MIP skills of both parents and children as well as to reduce children's use of alcohol and tobacco. The use of a web application as the mode of program delivery was selected to address the barriers commonly encountered by program developers trying to deliver in-person prevention programs to rural families. The current study examines the effectiveness of *MDF* for changing skills, attitudes, and behaviors associated with interpretation of media messages and substance use. The target population consists of parents and their third-to-fifth grade children living in rural communities. The evaluation was conducted using a randomized control group design that includes a short-term follow-up assessment administered several months after program completion.

## Method

### Participants

This study sampled families living in the two states in the U.S. that have the largest rural populations (i.e., Texas and North Carolina). Three contiguous counties in each state were selected as study sites because these counties were diverse in terms of poverty level and geographic locations (i.e., one county outside of a metropolitan area – USDA Rural-Urban Continuum Codes 1 and 2, one county outside of a micropolitan area – USDA Rural-Urban Continuum Code 4, one county not near a metropolitan/micropolitan area – USDA Rural-Urban Continuum Code 6). Families with 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> graders from the selected counties who owned a computer, had access to the internet at home, and spoke English were invited to participate in the study through a variety of recruitment methods, including media, flyers, and community event presence. A total of 229 families were recruited to participate in the study. One parent/caregiver and one child (in 3<sup>rd</sup>-5<sup>th</sup> grades) in each family self-selected to complete the study questionnaires. A total of 83 parent-child pairs completed the pretest and were randomly assigned to receive *Media Detective Family (MDF)* (n = 47) or a control computer program (n = 36) between pre- and posttest questionnaires. All members of the family were welcome to use the program together; however, the parent and child participants in the research study were asked to complete the entire program together. The sample was about equally divided across age groups (i.e., 36% of the children were in third grade, 33% in fourth grade, and 31% in fifth grade). The children in the sample were also about equally divided by gender (i.e., 52% female). A total of 63% (N = 52) of participating families completed the posttest administered one month after the pre-test (n=22 intervention families; n=26 control families). Also, 51% (N = 42) of participating families completed the three month follow-up questionnaire (n=12 intervention families; n=22 control families). The demographic composition of families who dropped out of the study between the intervention and control groups was similar (i.e., male parent – 16%, 9%; white parent – 75%, 85%; non-Hispanic parent – 93%, 100%; mean parent age – 39, 37, male child – 47%, 61%; white child – 80%, 84%; non-Hispanic child – 90%, 92%; mean child age – 9, 9).

### Design and Procedure

Pretest, posttest, and three-month follow-up data were collected through administration of audio computer-assisted self-interview (audio CASI) questionnaires. Data collection was conducted at free public facilities (e.g., libraries, community colleges) located near participants' homes. Parents and children completed questionnaires simultaneously on separate computer devices in private spaces. Families were randomized to the intervention and control groups within state and by gender prior to completing the pretest assessment. Parents provided informed consent for their own participation in the study as well as permission for their child's participation in the study. Children assented to their own participation. After completing the pretest questionnaire, intervention group families received online access to *MDF* and control group families received a copy of the *Family Game Night (FGN)* CD-ROM by Hasbro to use on their computers or gaming systems (e.g., Wii). *FGN* is a mini-game collection with six digitized classic board games (i.e., Yahtzee, Sorry!) that can be played with up to four players. This control program contains no media literacy education or substance abuse prevention programming.

Families received incentives for completing questionnaires (i.e., \$20, \$30, and \$40, respectively) and \$5 for keeping track of the amount of time they spent using the assigned program. If families did not complete the assigned program within two months of their pretest date, further data collection was not continued.

**The Intervention**—*MDF* is built upon the scope and sequence as well as the skills and characters in the school-based *Media Detective* program. Because *MDF* was designed for both family activity and entertainment purposes, unlike the school-based program, it is built around solving a problem that has a plot and story that ties the parts of the program together. Parents and their children are trained together to become media detectives, who can solve a series of mysteries that are related to advertising. There are Family Investigation Time prompts throughout the program, where families are encouraged to discuss different topics together that are related to solving the cases. The family discussions enable children and parents to develop and practice critical thinking and communication skills that should reduce their susceptibility to media persuasion. *MDF* is comprised of seven lessons including an Introduction, Cases 1 - 5, and a Conclusion. Each Case teaches a clue that can be used to help deconstruct media messages. The cases were designed to strengthen the logical processing skills that are identified in the MIP model including reducing the realism and similarity of media messages (see Table 1 for more details). Lessons can be completed on demand and are self-paced; after a pause in completing the program, the software application cues participants about cases that are not yet solved.

## Measures

### Parent Report

**Demographic Characteristics:** Parents reported on their own gender, age, race, and ethnicity and the gender, age, race, and ethnicity of their participating child.

**Parent-Child Communication Behaviors:** Parents responded to questions assessing their frequency of communication with their children about substance use. Nine items were adapted from the Targeted Parent-Child Communication about Alcohol scale (TPCCA; Miller-Day & Kam, 2010) and a parallel set of nine items were administered for assessing communication about tobacco (i.e., Targeted Parent-Child Communication about Tobacco scale). Parents indicated their response from 1 (*Never*) to 4 (*A lot of times*) to items such as “*Have you warned your child about the dangers of drinking alcohol/tobacco?*” Our analyses revealed excellent reliability for the scales ( $\alpha = .84$  and  $\alpha = .88$ , respectively).

**Media Deconstruction Skills:** Critical thinking skills were assessed using a performance-based task (Kupersmidt et al., 2010) involving participants providing open-ended responses to a series of prompts about one alcohol and one tobacco advertisement (e.g., “Tell me about this advertisement”). The two advertisements were created as stimuli for this measure by professional graphic designers. The alcohol ad used a romantic appeal strategy (i.e., “Stir It Up”) with an image of a stylishly dressed man at a club surrounded by two women. The tobacco ad used a popular or cool appeal strategy (i.e., “Always In STYLE”) with images of young adults having fun in a large group.

Trained coders, blind to condition, scored the open-ended responses in six categories. *Product* (0-3) assessed ability to recognize what product was being promoted. *Target Audience* (0-3) assessed ability to analyze who the ad was designed to persuade. *Purpose* (0-2) assessed understanding that the ad was designed to sell a product. *Ad Hook* (0-1) assessed understanding of how slogans and claims are used in the ad to persuade the target audience. *Hidden Messages* (0-2) assessed ability to recognize implied promises in the ad. *Missing Information* (0-2) evaluated the degree to which the participant understood that the ad left out information about the negative health effects of the product. Scoring criteria included points for degree of detail in responses. For example, with respect to the Product category for the tobacco ad, a response would be scored a “0” for not mentioning anything related to the product; a “1” for describing the use of the product (“they are smoking”); a “2” for identifying the product type (“cigarettes”) or the brand name (“Style”); or a “3” for identifying the brand name and product type (“Style cigarettes”). Scores were summed across categories for each ad to create two composite scores with each ranging from 0 to 13. Inter-rater reliability was calculated on the coding of 20% of the responses ( $\kappa = .78$ ).

**Dosage (family program use at Posttest and Follow-up only):** Parents completed a log of program use for each time point. If the parent did not log the number of minutes used, then he or she estimated the number of times the program was used as well as a range of minutes (e.g., between 15 and 30 minutes) spent using the program. From the logs, total participation time was calculated in minutes and used as the measure of *dosage*.

**Program Satisfaction (Intervention Group Posttest and Follow-up only):** Parents reported their level of satisfaction from 1 (“Poor”) to 5 (“Excellent”) in response to eight items constructed to assess *ease of use of, convenience of, thoroughness of, amount of content in, topic appropriateness of, appeal of, engagement with, and benefit of the MDF* program.

*Perceived program impact on readiness for action* was also assessed on the posttest through parent ratings on their readiness to engage in communication and monitoring behaviors related to MLE and substance use. Parents indicated their response from 1 (Much less) to 5 (Much more) to the question “*As compared to before completing the Media Detective Family program, how would you describe your readiness in each area?*” Areas assessed included items such as “Talking with this child about substance use” (see Table 3.)

### **Child Report**

**Substance Use:** Based on items adapted from Monitoring the Future (Johnston, O’Malley, Bachman, & Schulenberg, 2012), children reported *Current Substance Use* by indicating how often they used tobacco and alcohol in the past 30 days. Children answered separately for alcohol and tobacco use using a scale from 1 (0 days) to 7 (All 30 days).

**Willingness to Use Substances:** Seven items (adapted from Andrews, Hampson, Barckley, Gerrard, & Gibbons, 2008) asked about how willing participants are to try alcohol (*Willingness to Use Alcohol*;  $\alpha = .68$ ) and tobacco (*Willingness to Use Tobacco*;  $\alpha = .93$ ) in particular peer-group situations. For example, participants were asked “*Suppose you were*

with a group of kids and there were some cigarettes you could have if you wanted. How willing would you be to do the following things?" Participants responded on a scale of 1 (Not at all willing) to 4 (Very willing) to items such as "Take one puff" and "Smoke a whole cigarette." Measures of willingness for substance use are derived from social-cognitive theory and have been shown in several studies to predict substance use at later ages (Gerrard et al., 2008; Gibbons et al., 2003).

**Media Deconstruction Skills:** Children completed the same performance-based assessment task as their parents (Kupersmidt, Scull, & Austin, 2010). Coding of the responses was completed using the same system used to code parent responses.

**Program Satisfaction:** Children responded to four questions asking whether they learned anything new, if the cases were interesting, how glad they were that they learned the material, and whether they would refer friends to the program on a scale from 1 ("Not at all") to 4 ("Yes, a lot").

## Results

### Overview of Analyses

The analyses were organized into four main parts. First, preliminary analyses were conducted to check whether the randomization process resulted in creating equivalent group assignments prior to the inception of the intervention. Second, intervention dosages were compared between the treatment and comparison groups to control for the amount of exposure to the intervention program. Third, the main analyses consisted of a series of conditional growth curve models (Bollen & Curran, 2006) using the general linear mixed model (GLMM) framework. The fourth set of analyses consisted of calculating descriptive statistics on measures of consumer satisfaction with the *MDF* program.

### Test of Randomization Effectiveness

Demographic differences between the *MDF* and comparison groups were examined to assess covariate balance due to randomization for the following variables: child age, child gender, child race, and child ethnicity. None of the variables were found to differ significantly between the *MDF* and the comparison conditions.

### Dosage

Intervention group families reported the average time spent using *MDF* between the pretest and posttest was 181.19 minutes ( $SD = 94.36$ ) and between posttest and follow-up was 10.24 minutes ( $SD = 46.92$ ). Control group families reported the average time spent using *FGN* between pretest and posttest was 248.45 minutes ( $SD = 142.36$ ) and between posttest and follow-up was 82.77 minutes ( $SD = 147.43$ ). A t-test revealed that program dosage between the pretest and posttest was not significantly different between the two groups ( $p > .05$ ). However, the control group families spent significantly ( $p < .05$ ) more time together using the control group program as compared with the intervention group used *MDF* during the three-month period between the posttest and follow-up. This difference is likely

explained by the fact that the *MDF* program can be completed in its entirety and the control computer game has replay ability and up to six games to play.

### Outcome Analyses

Within the GLMM framework with repeated measures data, random growth coefficients are estimated for each individual, assuming a linear model linking time to the outcome: an intercept (estimated level of the outcome at time = 0) and slope-over-time (estimated linear change in the outcome per 1 unit of time). For the GLMM longitudinal models, Time was the only predictor tested at the within-individual/repeated measures level and program condition was the only predictor tested at the between-individual level to account for differences in changes over time across individuals. Because of the relatively small sample size, we were limited to examining the two main predictors in the outcome models. In other words, the impact of the program condition (*MDF* versus comparison) was captured by the interaction between time and condition, such that a statistically significant and/or meaningful effect (size) would indicate differences in the average levels of change between the *MDF* and comparison conditions. Missingness on outcome variables was modeled under the missing-at-random assumption (using restricted maximum likelihood estimation: Schafer & Graham, 2002). Standardized mean difference (i.e., Cohen's *d* effect size) scores are noted in addition to statistical significance, in the evaluation of outcome differences between *MDF* and the comparison condition. Cohen's *d* values greater than  $|.20|$  were noted as “clinically meaningful”. See Table 2 for descriptive statistics (i.e., means, standard deviations) of the outcome variable by condition across the three time points.

**Substance Use**—*MDF* yielded statistically significant reductions over time on the key outcome of current substance use ( $b = -.102 (.043)$ ,  $t = -2.29$ ,  $p = .029$ ,  $d = -.80$ ). Children who received *MDF* reported a significant reduction in their use of tobacco and alcohol over time as opposed to children who did not receive *MDF*, as shown in Figure 1.

**Willingness to Use Substances**—No statistically significant differences over time in child's self-reported willingness to use substances were found between intervention and control groups. However, as compared to the control group, children receiving *MDF* yielded meaningful changes with respect to effect size on both willingness to try alcohol ( $d = -.22$ ) and willingness to try cigarettes ( $d = -.50$ ).

**Parent-Child Communication Behaviors**—No statistically significant differences or meaningful changes with respect to effect size were found between groups over time for any parent-reported parent-child communication behaviors.

**Media Deconstruction Skills**—No statistically significant differences in child deconstruction skills were found between intervention and control groups over time. However, as compared to the control group, children receiving *MDF* yielded meaningful changes with respect to effect size on tobacco deconstruction skills ( $d = .47$ ). Analyses revealed no statistically significant differences in parent deconstruction skills. However, as compared to the control group, parents receiving *MDF* yielded meaningful changes with



respect to effect size on alcohol deconstruction skills ( $d = .67$ ) and tobacco deconstruction skills ( $d = .22$ ).

**Program Satisfaction**—Parents in the intervention group ( $N = 22$ ) reported very positive responses (i.e., *Excellent*, *Very Good*, and *Good*) regarding their satisfaction with *MDF*, with percentages of positive responses at or above 86% on all topics, including ease of use, convenience, thoroughness, appeal, motivational, and topic appropriateness. More than half of the child participants reported high levels of satisfaction with the program; however, the percentage of children reporting high levels of satisfaction was smaller than their parents. Although many children found the program to be interesting (62%) and were glad to have learned the material (55%), children were less enthusiastic about recommending the program to their friends (38%).

Table 3 shows results of parents' report of readiness to engage in behaviors related to media literacy and substance use after completing *MDF*. Half of parents reported on the posttest being “more” or “much more” ready to talk with their children about substance use, the media, and the purpose of advertising than before the program. In addition, parents also reported feeling higher levels of efficacy with their own media analysis skills thinking that they were better able to identify ways that advertisements target specific groups of people and being more aware of the fact that useful health information is missing from advertisements for alcohol and tobacco. Although not a majority, it is notable that one-third of the parent participants reported that they were “more” or “much more” ready to change their own substance use behaviors after using *MDF*.

## Discussion

This study examined the effectiveness of the *Media Detective Family* program on child and parent outcomes related to substance use, critical thinking about media messages, and parent-child communication behaviors in families with third through fifth grade students living in rural areas. The results demonstrated that this brief family-based MLE program was effective in reducing substance use experimentation in children. This constitutes the most important finding from this study in that it is the first in the field to report a reduction in substance use behaviors as a function of participating in a MLE program using a rigorous experimental design. These findings are particularly notable in light of the use of random assignment to conditions, an attention-matched control group, and a short-term follow-up assessment as well as access to a relatively small sample of study participants.

MLE interventions are frequently brief, and previous studies of the effectiveness of MLE programs have primarily conducted posttests immediately after program completion. These design decisions have limited the ability to study behavioral outcomes, since the window of substance usage would overlap with the participation in the program which would not constitute an optimal design for evaluating the impact of the program on substance use behaviors. Thus, previous evaluations using immediate posttest assessments have reported that MLE interventions for substance abuse prevention are effective but have had to rely upon attitudinal data on children's willingness and intent to use substances in the future. The

current study makes a novel contribution to the literature by extending our understanding of the impact of MLE to go beyond attitudinal change to address behavior change in children.

Although *MDF* was conceptualized as a preventive intervention, the results suggest that the program can also be a successful intervention for high-risk children who are currently experimenting with alcohol or tobacco. This is an especially important finding as early substance use experimentation is related to a host of negative outcomes in adolescence. In addition, although not statistically significant, effect size analyses revealed a clinically-meaningful reduction for willingness to use substances in the intervention group. Willingness to use has been linked to future substance use behaviors in youth (Gerrard et al., 2008; Gibbons et al., 2003; Pomery, Gibbons, Reis-Bergan, & Gerrard, 2008; Spijkerman et al., 2005). Taken together, these results support using family-based MLE programs as an effective strategy for childhood substance use prevention and intervention efforts.

*MDF* was designed with the goal of helping families improve their media literacy skills to help children resist the persuasion of pro-alcohol and pro-tobacco media messages. Results from the RCT did not reveal a statistically significant effect of the intervention on parent or child media deconstruction skills, which may be because the study was underpowered. Notably, there were clinically meaningful effect sizes in the appropriate direction for media deconstruction skills for both parents and children who received *MDF*.

In addition, it was proposed that *MDF* would encourage family discussions around unrealistic media messages and the negative health consequences of alcohol and tobacco use; however, no statistically significant or clinically-meaningful changes were found in parent-child communication. The communication measure focused on the frequency of parent-child communication about substance use rather than the quality of their communication. Therefore, future research might explore how *MDF* impacts multiple dimensions of parent-child communication and not just frequency.

The present study provides evidence that *MDF* positively impacts parents' preparedness for having conversations with their children about substance use and the media. On the posttest, parents in the intervention group were asked to comment on their readiness to continue discussions about media literacy and substance use with their child after receiving *MDF*. Most parents reported an increase in readiness to engage in a variety of such behaviors, which underscores the importance of including parents in prevention and intervention efforts. As opposed to the frequency of parent-child communication, this increase in readiness for parent-child communication about substances and media may hold more importance for child outcomes by focusing on the quality of communication.

The current study has several strengths. First, the study used a rigorous RCT design. Second, the study examined behavioral substance use outcomes. Third, the study included a performance measure of critical thinking skills about media messages. Fourth, the use of a follow-up assessment three months after the posttest allowed for examination of whether effects were sustained or changed over time. Fifth, the use of an online intervention hosted in a sophisticated learning management system allowed for the researchers to verify that the intervention group families completed the program activities.

There are four main limitations of this study. First, substance use behaviors and even willingness to use substances in the future are uncommon in childhood. Coupled with the relatively short timeframe between assessments, the analyses suffer from floor effects. A longitudinal design that follows youth throughout childhood and into adolescence would reveal whether the program can prevent interest in substance use from emerging. Second, the study's small sample size impacted the detection of significant findings for outcomes that had small or medium effect sizes and precluded the ability to conduct mediator analyses. Thus, we were not able to conclude whether improving media deconstruction skills mediated program effectiveness for reducing children's substance use behaviors. Third, as the sample for this study was drawn from only rural counties, the findings cannot necessarily be generalized to families living outside of rural areas. However, families with elementary school-aged children living in urban and suburban areas experience similar challenges to participating in voluntary prevention programs to those facing rural families such as lack of time, transportation, and childcare for younger children. Thus, it is likely that non-rural families would equally benefit from completing the *MDF* program. Fourth, other variables that are related to children's substance use behaviors (e.g., parents' own alcohol and tobacco use, access to substances at home) were not considered as control variables in the analyses.

Despite these limitations, this preliminary study of a media literacy education program for substance abuse prevention in childhood offers several exciting avenues for future research. First, the field would benefit from studies examining the factors that mediate program effectiveness using the MIP and Health Belief models as a foundation. The only studies located to date that examined mediators of MLE programs on substance abuse outcomes were conducted with middle (Kupersmidt et al., 2012) and high school students (Authors, under review), reporting media deconstruction skills and normative beliefs about the prevalence of peer use of substances, respectively, as mediating variables. In addition, given the fact that the intervention is conducted with parents and children together, parenting variables may contribute to program effectiveness. Consistent with the theory and research on possible parent mediators of media usage (Valkenburg, Kremer, Peeters, & Marseille, 1999), this program may have improved the quality of parent-child communication about both the media and substance use which may have impacted children's behaviors. Ongoing practice and application of media analysis skills with parents may serve to continuously reinforce newfound critical analysis skills and reduce advertising and media influences around substance use. Testing the factors that may affect the pathway through which *MDF* works would be an exciting next step which could inform both theory of the mechanisms underlying the relationship between message interpretation processing and risky health behaviors as well as the development of future prevention and intervention programs.

Second, the majority of elementary school-aged children are not experimenting with alcohol and tobacco. Therefore, it would be most beneficial to examine the effectiveness of the program using a longer-term follow-up study that spans several years, until the children enter adolescence, when experimentation with substance use increases in prevalence. Third, erosion of the effects of preventive interventions is a possibility, and longitudinal research may clarify whether the benefits of a family-based MLE program on childhood substance abuse are maintained into adolescence or require boosters to sustain its effects. A final direction is test the generalizability of the program with other populations of families such

as urban or suburban families. Effective, engaging web-based programs have the potential to be widely disseminated and have a significant impact on public health.

## Conclusion

In conclusion, the current study provides the first evidence that a web-based substance use prevention program using an MLE framework and designed for use by families could be an effective intervention for reduction of children's substance use experimentation. After receiving the program, parents reported an increased readiness to critically interpret media messages about substances with their children. The high program satisfaction ratings by parents also give weight to the use of MLE as an engaging and convenient family activity. The findings add to the literature on the efficacy of MLE for substance abuse prevention, typically implemented in school-based contexts, to establishing its efficacy in a family-based intervention.

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## References

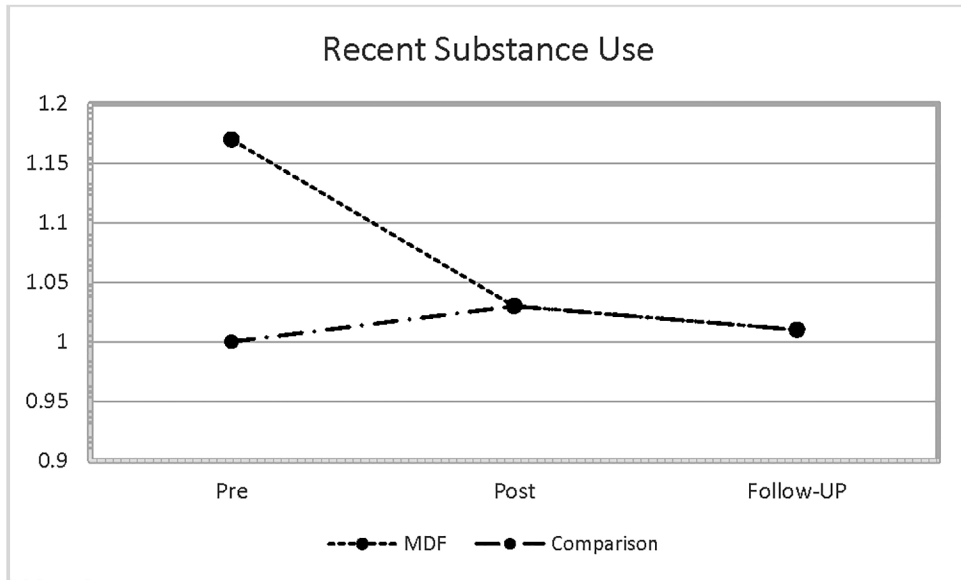
- Authors (under review). Short-term efficacy of the Media Aware program: A cluster randomized trial of a media literacy education program for high school substance abuse prevention.
- Andrews JA, Hampson SE, Barckley M, Gerrard M, Gibbons FX. The effect of early cognitions on cigarette and alcohol use during adolescence. *Psychology of Addictive Behaviors*. 2008; 22:96–106. [PubMed: 18298235]
- Austin EW, Johnson KK. Effects of general and alcohol-specific media literacy training on children's decision making about alcohol. *Journal of Health Communication*. 1997; 2:17–42. [PubMed: 10977232]
- Austin, EW. The message interpretation process model. In: Arnett, JJ., editor. *Encyclopedia of Children, Adolescents, and the Media*. Thousand Oaks, CA: Sage; 2007. p. 535-536.
- Bollen, KA., Curran, PJ. *Latent curve models: A structural equation perspective*. Hoboken, NJ: Wiley-Interscience; 2006.
- Bush P, Iannotti RJ. A children's health belief model. *Medical Care*. 1990; 28:69–86. [PubMed: 2296217]
- CA: A Cancer Journal for Clinician, 2002 Cigarette Use Among Teens Inches Downward: Rate is Higher in Rural Areas. *CA: A Cancer Journal for Clinicians*. 2002; 52:3–4. Retrieved November 2, 2010 from <http://caonline.amcancersoc.org/cgi/content/full/52/1/3>.
- Christenson, PG., Henriksen, L., Roberts, DF. Substance use in popular prime-time television. Office of National Drug Control Policy; Mediascope: 2000.
- DeBenedittis, P., Loughery, M., McCannon, B., Goldborough, S. Alcohol prevention children love to learn; Presented to the Alcohol Policy XII Conference, Alcohol & Crime, Research for Practice and Prevention; Washington, D.C.. 2000.
- DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age of first alcohol use: A risk factor for the development of alcohol disorders. *American Journal of Psychiatry*. 2000; 157:745–750. [PubMed: 10784467]

- Gerrard M, Gibbons FX, Houlihan AE, Stock ML, Pomery EA. A dual-process approach to health risk decision making. *Developmental Review*. 2008; 28:29–61.
- Gibbons, FX., Gerrard, M., Lane, DJ. A social reaction model of adolescent health risk. In: Suls, JM., Wallston, K., editors. *Social psychological foundations of health and illness*. Oxford, UK: Basil Blackwell; 2003. p. 107-136.
- Goldstein A, Sobel R, Newman G. Tobacco and alcohol use in G-rated children's animated films. *Journal of the American Medical Association*. 1999; 281:1131–1136. [PubMed: 10188668]
- Gruber E, DiClemente RJ, Anderson MM, LODOCO M. Early drinking onset and its association with alcohol use and problem behavior in late adolescence. *Preventive Medicine*. 1996; 25:293–300. [PubMed: 8781007]
- Harakeh Z, Scholte RHJ, Vermulst AA, de Vries H, Engels RCME. Parental factors and adolescents' smoking behavior: An extension of the theory of planned behavior. *Preventive Medicine*. 2004; 39:951–961. [PubMed: 15475029]
- HHS. *The Health Consequences of Smoking -50 Years of Progress, A Report of the Surgeon General*. 2014. <http://www.surgeongeneral.gov/library/reports/50-years-of-progress/>
- Janz NK, Becker MH. The health belief model: A decade later. *Health Education Quarterly*. 1984; 11:1–47. [PubMed: 6392204]
- Johnston, LD., O'Malley, PM., Bachman, JG., Schulenberg, JE. *Monitoring the Future national results on adolescent drug use: Overview of key findings, 2011*. Ann Arbor: Institute for Social Research, The University of Michigan; 2012.
- Kodl MM, Mermelstein R. Beyond modeling: Parenting practices, parental smoking history, and adolescent cigarette smoking. *Addictive Behaviors*. 2004; 29:17–32. [PubMed: 14667418]
- Media literacy education for elementary school substance use prevention: Study of *Media Detective*. *Pediatrics*. 2010; 126:525–531. Authors. [PubMed: 20732940]
- Kupersmidt J, Scull T, Benson J. Improving media message interpretation processing skills to promote healthy decision making about substance use: The effects of the middle school media ready curriculum. *Journal of Health Communication*. 2012; 17:546–563. [PubMed: 22339322]
- Levant RF. The use of marketing techniques to facilitate acceptance of parent education programs: A case example. *Family Relations*. 1987; 36:246–251.
- Maine Rural Health Research Center. *Substance Abuse Among Rural Youth: A little meth and a lot of booze* Muskie School of Public Service. University of Southern Maine; 2007. Retrieved November 2<sup>nd</sup>, 2010 from <http://muskie.usm.maine.edu/Publications/rural/pb35a.pdf>
- Miller-Day M, Kam J. More than just openness: Developing and validating a measure of targeted parent-child communication about alcohol. *Health Communication*. 2010; 25:293–302. [PubMed: 20512711]
- Miller PM, Smith GT, Goldman MS. Emergence of alcohol expectancies in childhood: A possible critical period. *Journal of Studies on Alcohol*. 1990; 51:343–349. [PubMed: 2359308]
- Perrin, A., Duggan, M. *Americans' Internet Access: 2000-2015*. Pew Research Center; 2015 Jun.
- Pomery EA, Gibbons FX, Reis-Bergan M, Gerrard M. Experience as a moderator of the developmental shift from willingness to intentions. *Personality and Social Psychology Bulletin*. 2008; 35:894–908.
- Primack BA, Dalton MA, Carroll MV, Agarwal AA, Fine MJ. Content analysis of tobacco, alcohol, and other drugs in popular music. *Archives of Pediatrics & Adolescent Medicine*. 2008; 162:169–175. [PubMed: 18250243]
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods*. 2002; 7:147–177. [PubMed: 12090408]
- Scull TM, Kupersmidt JB, Erasquin JT. The impact of media-related cognitions on children's substance use outcomes in the context of parental and peer substance use. *Journal of Youth and Adolescence*. 2014; 43:717–728. [PubMed: 24002678]
- Scull T, Kupersmidt J, Parker A, Elmore K, Benson J. Adolescents' media-related cognitions and substance use in the context of parental and peer influences. *Journal of Youth and Adolescence*. 2010; 39:981–998. [PubMed: 19795197]
- Simons-Morton BG, Haynie DL. Psychosocial predictors of increased smoking stage among sixth graders. *American Journal of Health Behaviors*. 2003; 27:592–602.

- Spijkerman R, van den Eijnden RJ, Engels RC. Self-comparison processes, prototypes, and smoking onset among early adolescents. *Preventive Medicine*. 2005; 40:785–794. [PubMed: 15850880]
- Spoth R, Redmond C. Identifying program preferences through conjoint analysis: Illustrative results from a parent sample. *American Journal of Health Promotion*. 1993; 8:124. [PubMed: 10146557]
- Stigler MH, Perry CL, Komro KA, Cudeck R, Williams CL. Teasing apart a multiple component approach to adolescent alcohol prevention: What worked in project northland? *Prevention Science*. 2006; 7:269–280. [PubMed: 16752097]
- Strasburger VC, Donnerstein E. Children, adolescents, and the media: Issues and solutions. *Pediatrics*. 1999; 103:129–139. [PubMed: 9917450]
- Valkenburg PM, Kremer M, Peeters AL, Marseille NM. Developing a scale to assess three styles of television mediation. *Journal of Broadcasting & Electronic Media*. 1999; 43(1):52–66.

## Abbreviations

<b>MDF</b>	Media Detective Family
<b>MLE</b>	Media Literacy Education



**Figure 1.** Mean number of days of child substance use (in past 30 days) over time by group.

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**Table 1**  
**Topics included in the *Media Detective Family* program**

Section	Clue	Topics
<b>Introduction</b>	Introduce Mystery	<ul style="list-style-type: none"> <li>• Instructions about how to navigate through the software program.</li> <li>• Introduction of main characters who narrate the story.</li> <li>• Introduction of the story presenting a media mystery that will be solved by the participating family.</li> </ul>
<b>Case 1</b>	Product	<ul style="list-style-type: none"> <li>• Introduce the idea that all advertisements try to sell a product.</li> <li>• Families discuss how it can sometimes be difficult to figure out what is actually being sold in an ad.</li> <li>• Practice identifying the product in ads.</li> </ul>
<b>Case 2</b>	Target Audience	<ul style="list-style-type: none"> <li>• Introduce the idea that all ads have a target audience.</li> <li>• Learn clues for figuring out target audiences.</li> <li>• Practice identifying the target audience in ad examples.</li> <li>• Families discuss why it is important to figure out whether you are the target audience for an ad.</li> <li>• Families discuss why an ad for a product for adults only (e.g., alcohol) might target children (i.e., increase brand awareness).</li> </ul>
<b>Case 3</b>	Ad Hook	<ul style="list-style-type: none"> <li>• Introduce the idea that all ads have a hook that is used to attract the target audience.</li> <li>• Learn clues for figuring out ad hooks.</li> <li>• Practice identifying ad hooks in ad examples.</li> <li>• Families discuss why an advertisement might capture the attention of a target audience.</li> <li>• Families discuss the fact that there are many different kinds of ad hooks and that ads may use more than one ad hook.</li> </ul>
<b>Case 4</b>	Hidden Messages	<ul style="list-style-type: none"> <li>• Introduce the idea that add ads have hidden messages.</li> <li>• Learn a method for identifying the hidden messages in an ad.</li> <li>• Compare the applicability of the hidden message in an ad to each participant's personal values.</li> <li>• Practice identifying hidden messages in ad examples.</li> <li>• Families discuss whether these hidden messages are reflect reality and are true.</li> </ul>
<b>Case 5</b>	Missing Information	<ul style="list-style-type: none"> <li>• Introduce the idea that some information is selectively included and some information is strategically missing in ads.</li> <li>• Families discuss why it is important to think about both included and missing information in ads.</li> <li>• Learn that the information that is missing in ads is usually the health consequences of product use.</li> <li>• Practice identifying information that is missing in alcohol, tobacco, and energy drink ads.</li> <li>• Families discuss why advertisers leave out health information from ads.</li> </ul>
<b>Conclusion</b>	All Five Clues	<ul style="list-style-type: none"> <li>• Apply logical processing skills to solve media mysteries about ads for alcohol, tobacco, and energy drinks.</li> <li>• Learn accurate, factual health information about alcohol, tobacco, and energy drinks.</li> </ul>



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Section	Clue	Topics
		<ul style="list-style-type: none"><li>• Practice creating counter-ads that include information that is typically missing from alcohol and tobacco ads.</li></ul>

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**Table 2**  
**Descriptive statistics for the youth outcome variables by condition at three time points**

Outcome	Respondent	Pretest		Posttest		Follow-up	
		Intervention <i>M (SD)</i>	Control <i>M (SD)</i>	Intervention <i>M (SD)</i>	Control <i>M (SD)</i>	Intervention <i>M (SD)</i>	Control <i>M (SD)</i>
Substance use behaviors	Child	1.18 (.62)	1.00 (.00)	1.03 (.15)	1.04 (.20)	1.01 (.05)	1.04 (.13)
Willingness to use substances	Child	1.05 (.21)	1.02 (.08)	1.06 (.21)	1.00 (.00)	1.05 (.24)	1.03 (.09)
Parent-child communication							
Alcohol	Parent	2.34 (.82)	2.56 (.80)	2.46 (.83)	2.88 (.87)	2.34 (.90)	2.78 (.93)
Tobacco	Parent	2.13 (.83)	2.41 (.68)	2.19 (.81)	2.36 (.91)	2.01 (.68)	2.43 (.92)
Deconstruction skills							
Alcohol	Parent	6.17 (1.90)	6.39 (2.00)	6.92 (1.29)	6.11 (1.76)	6.44 (1.50)	5.79 (1.67)
	Child	4.64 (1.92)	4.61 (1.89)	6.36 (2.23)	5.04 (1.99)	6.17 (2.43)	6.29 (2.07)
Tobacco	Parent	5.44 (1.76)	5.39 (1.57)	5.92 (1.35)	5.48 (2.08)	6.33 (1.33)	5.63 (1.44)
	Child	4.47 (2.31)	4.78 (2.09)	6.56 (2.27)	5.08 (2.49)	6.06 (2.73)	6.25 (2.69)

**Table 3**  
**Perceived impact of MDF on parental readiness for action at posttest with the child participating in the study (N=22)**

As compared to before the MDF program, how would you describe your readiness in each area?	Mean	SD	% Positive Rating
Helping this child understand the purpose of advertising	4.29	0.69	87.50%
Identifying ways that advertisements target specific age groups, people with particular interests, etc.	4.17	0.76	79.16%
Being aware of the health risk information left out of ads for tobacco and alcohol	4.17	0.82	75.00%
Talking with this child about media messages	4.04	0.81	70.80%
Assessing the realism of advertising	3.91	0.78	66.67%
Monitoring this child's media exposure	3.83	0.87	54.16%
Talking with this child about your expectations for his/her behavior regarding substance use	3.75	0.79	54.16%
Talking with this child about substance use	3.77	0.81	50.00%
Monitoring media exposure for other children in the household	3.83	0.92	50.00%
Selecting age-appropriate TV shows, movies, video games, Internet content, etc. for this child	3.54	0.72	41.66%
Changing the availability of substances to children in your household (e.g., locking cabinets where alcohol is stored, keeping count of your cigarettes)	3.50	0.72	37.50%
Changing how you yourself use substances (e.g., changing the frequency of use or changing use in situations where children are present)	3.50	0.78	33.34%

Note: 5 point Likert scale (1 = Much less, 2 = Less, 3 = About the same, 4 = More, 5 = Much More). % Positive rating includes scores of 4 and 5. MDF = Media Detective Family.