

The effect of endorsement by local opinion leaders and testimonials from teachers on the dissemination of a web-based smoking prevention program

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Abstract

The effect of endorsement by local opinion leaders and teacher testimonials on dissemination of a web-based program to prevent smoking was tested in a group-randomized 2×2 factorial post-test-only design with 394 junior and senior high schools. Schools were assigned to condition by region served by local tobacco control coalitions. Visits to the 'Consider This' (CT) website were recorded. Teachers at 226 schools completed a post-test. More schools receiving the opinion leader letter had visits to the website by teachers (12%) than schools not receiving it (4%, $P = 0.015$). More teachers at schools receiving the testimonials reported reading the materials (29%) than those not receiving them (22%, $P = 0.059$). Testimonials created more intentions to use CT (49% testimonials, 35% no testimonials, $P = 0.047$). Testimonials may be effective at increasing teachers' exposure to the promotional materials but recommendations from opinion leaders appear to convince some teachers to visit and assign students to use it.

Introduction

School-based smoking prevention programs are an important component of a comprehensive tobacco

control [1]; however, they will have little impact if they are not effectively disseminated. In this project, two message strategies—endorsement by local opinion leaders and testimonials from teachers—were tested to improve the dissemination of a web-based smoking prevention program entitled 'Consider This' (CT) [2–4], free of charge to schools.

CT was developed to reduce smoking among adolescents aged 12–15 years [3]. Smoking by adolescents rose substantially in the 1990s [5]; most adolescent smokers start before age 16 and one in four experiment before age 11 [6]. Content in CT is intended for non-smokers and children who are experimenting. It is designed to counter social pressures to smoke, debunk myths surrounding smoking, correct norms regarding smoking, model social skills, teach stress management, promote decision making not to smoking and clarify personal values [3]. CT successfully reduced smoking in one of two randomized trials in which it was tested [4].

Computer-based instruction has been used in schools for several years, but Internet programs are still novel. Thus, teachers providing smoking prevention instruction should be early majority users for computer-based instruction and early adopters for Internet programs. According to the diffusion of innovations model (DIM) [7], they should be attuned to communication from outside of their school environment via mass media when making adoption decisions. Hence, communication about CT should reach them, inform them about the program and convince them to use it. However, the persuasiveness should be enhanced by strategies that improve the communication's credibility and highlight program characteristics that influence adoption according to DIM.

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Opinion leadership is an important influence process in the DIM [8], because information alone often does not stimulate adoption [9–12]. Usually, people contemplate a new product based on communication with others that they feel are expert and trustworthy, especially when uncertainty is high and they want to resolve dissonance about the innovation [7].

One such opinion leader may be the director of the local tobacco control coalition from local health departments and organizations. They should be seen as experts in tobacco control. Directors may not be opinion leaders by the strictest definition, because they have a formal (rather than informal) role [8]. However, they should represent the local lead public health agency and operate within networks of community organizations that seek to improve the health of the community, including children.

Another common strategy in marketing is to provide testimonials from individuals who are similar to the audience [13, 14]. Testimonials, a form of informational appeals, may be persuasive by eliciting identification with the source or social response to the circumstances [14]. The narrative form of testimonials can increase identification over didactic reports [15]. Social identification can engender perceived similarity and increase persuasiveness. Experiences of other teachers may provide persuasive evidence that an Internet-based program has a high degree of fit with instructional procedures, is effective with students and is easily tried [8].

Both message strategies contain statements from outside individuals endorsing the program. Endorsements, usually by celebrity endorsers, have been studied in consumer contexts. They can improve evaluations of a product, but not always purchase intentions [16–18]. Endorsements are most effective when the endorser's characteristics and expertise are relevant to the consumers' beliefs and fit the product [19, 20] (see Forehand *et al.* [21] for organizational endorsements of ballot initiatives). Peer endorsers also can positively influence through perceived similarity and positive dispositional attributions about their preferences [22]. The message content of both opinion leader endorsements and testimonials may be processed heuristically, in dual processing models of persuasion, especially

when motivation to process messages is low [21, 23–25].

However, the two message strategies may differ in how they affect persuasiveness of promotional messages for CT. Opinion leaders' expertise and trustworthiness should derive from their presence in the local community and network of community organizations and previous interaction with school personnel. Social identification and similarity created by testimonials should arise from their narrative style and the endorser's experience in schools. Unfortunately, there is insufficient evidence to make predictions about the relative effectiveness of these strategies.

For this study, it was hypothesized that use of the CT program will be higher when schools received an endorsement by a local opinion leader (H1) and testimonials from teachers (H2). The combined effect of endorsement and testimonials was tested but the literature did not provide guidance in predicting whether a combined effect would occur. Also, evaluations of the characteristics of CT—compatibility, simplicity and relative advantage—will be positively associated with adoption (H3). Finally, a necessary condition for promotional efforts to work is to gain exposure to the messages [26, 27]. However, less attention has been paid to developing strategies to improve message exposure than to increasing message impact. Thus, we tested the prediction that the two message strategies would improve readership of the promotional materials (H4) and again probed (but did not predict) whether there was a combined effect.

Methods

Participants

Participants included teachers and school officials at Colorado public secondary schools (middle, junior high and senior high schools with Grades 7–12) ($n = 394$) in 29 regions (comprised of 38 of 65 counties in the state) where local tobacco control coalitions were funded by the state health department to conduct tobacco control efforts. Funds

were awarded to local public health agencies or county nursing services to recruit and operate the coalitions. The regions differed in urbanization (rural, suburban and urban), ethnicity of students, size of school districts and socioeconomic status

(Table I). The sample of regions was not stratified on any of these variables; randomization was used to balance the groups. To operationalize the opinion leader treatment and minimize cross-contamination among schools, randomization of schools occurred

Table I. Characteristics of regions^a assigned to experimental conditions

County	Population (2003)	Student enrollment (2003–04)	Per pupil expenditure (in \$) ^b (2003–04)	% White students ^b (2003–04)	% Of students receiving free/reduced lunch (2003–04)
Opinion leader letter and teacher testimonials					
Logan/Phillips/Yuma/Washington/Morgan/Sedgwick	70 738	13 388	5645.01–12 072.75	46.3–97.8	46.4
Montezuma/Dolores	29 760	46 881	5679.51–8148.57	45.6–94.8	47.0
Mineral	888	177	10 269.16	93.8	30.8
Prowers	14 140	2825	5842.93–7564.15	7.1–88.4	57.2
Rio Grande	12 318	2399	5950.89–6858.79	26.9–70.5	54.7
Weld	212 049	33 218	5536.05–11 069.69	8.3–94.4	41.4
Teacher testimonials only					
Archuleta/La Plata	57 503	4872	5843.65–6493.44	32.4–90.8	26.6
Chaffee/Lake	24 568	3356	5904.66–6184.59	83.8–93.5	35.6
Crowley	5464	603	6611.56	36.0–68.0	62.1
Custer	3790	493	6537.89	95.6–95.8	28.0
El Paso	550 141	99 165	5552.91–10 585.39	4.1–98.7	25.7
Fremont	47 586	6320	5519.25–7076.23	84.7–92.5	38.1
Jackson	1491	279	8206.79	83.1	36.2
Routt	20 780	2846	6047.14–7275.45	87.1–100.0	10.3
Opinion leader letter only					
Alamosa	15 065	2791	5741.50–7705.54	32.9–75.8	56.8
Baca	4164	1104	5946.48–11 900.41	65.6–100.0	47.8
Boulder	277 987	49 434	5818.47–5900.59	35.8–95.4	16.7
Clear Creek	9480	1216	6103.52	91.9–94.8	22.1
Delta	29 382	5087	5713.78	66.0–93.4	42.4
Gunnison	13 947	1641	6010.55	89.7–100.0	17.7
Teller	21 688	3735	5647.98–6449.85	84.1–93.0	18.8
No letter or testimonials					
Grand	13 016	1849	5920.75–6894.09	85.9–93.5	20.5
Hinsdale	768	85	12 646.81	95.3–95.3	26.5
Larimer	266 460	41 279	5589.53–6144.56	0.4–93.2	22.0
Las Animas/Huerfano	23 380	4351	5511.00–11 248.89	30.8–100.6	41.8
Mesa	124 664	20 886	5521.84–9674.88	53.2–91.6	40.1
Moffet	13 412	2512	5511.00	78.6–87.3	25.7
Park	16 498	2047	6114.36–6714.16	89.4–100.0	20.2
Pueblo	148 896	25 738	5527.28–5883.34	13.2–87.6	51.6

^aRegions served by local tobacco control coalitions were defined by county boundaries; in most cases a coalition served a single county but in a few cases a single coalition served multiple counties. ^bA range of per pupil expenditures and percent white students is presented when there was more than one public school district within a county.

by regions served by local coalitions, usually embodied by a county but in five instances included contiguous counties.

Experimental design

A group-randomized 2×2 post-test-only factorial design was conducted in 2003–04. The first factor was the presence of a letter from a local opinion leader endorsing CT. The second factor was of the presence of testimonials from teachers who had used CT successfully in the past included in a promotional brochure. Assignment to condition was made by regions served by local tobacco control coalitions. All conditions received promotional brochures on CT.

Promotional materials were mailed in December 2003, January 2004 and February 2004, addressed to Health Educator/School Nurse/Principal at the school. Superintendents in each school district received the promotional mailings with a letter from the researchers informing them about the project. Visits to the CT website by district officials were not included in the measure of website use.

Several outcome measures were collected. The primary outcome was visits by school personnel and students to the CT website. In a post-test telephone survey with one teacher or administrator per school, readership of the materials and evaluation of CT were measured. The survey was conducted by professionally trained interviewers from a local survey company (average = 22 min) in April and May 2004.

Promotional mailings

Every school received three mailings containing the same items and messages each time. A full-color three-paneled brochure was written by the researchers and designed by a professional graphic designer. It highlighted the interactive, tailored and rich multimedia features of CT and described how teachers and administrators could access the program online, free of charge. It emphasized the relative advantage of CT, ease of access, free of charge, compatibility with health education curriculum and effectiveness with students. The brochure also contained brief descriptions of program modules.

Letter templates for the local opinion leader—the director of the local tobacco control coalition or local health agency director—were created by the researchers. Each letter was brief and varied only temporally between the three mailings. Printed on letterhead from the local public health department or county nursing service, the text encouraged teachers to review the enclosed brochure and incorporate CT into their curriculum. It described the need for preventing smoking among local children, highlighted the simplicity and feasibility of CT and listed the website address and telephone numbers to call the researchers and multimedia programmers for technical support.

Coalition directors were recruited to the project by sending them a letter, noting the need for tobacco prevention in the schools and describing the CT program. The brochure and teacher testimonials were included and directors were encouraged to review CT. They were asked to help disseminate CT to secondary school teachers by contributing a letter to include with the promotional mailings and to encourage the use of CT if contacted by a teacher or school administrator. This letter was followed by a phone call from the Project Coordinator who confirmed their participation. Four of the 33 directors choose not to participate in the promotion of CT.

The researchers solicited testimonials from teachers who had successfully used CT during 2002–03; these teachers' schools were not enrolled in the study. They emphasized the positive features of CT to operationalize communication from these innovators to early adopters [8]. One of the researchers interviewed teachers and obtained text for the testimonials [28]. Consent was obtained from teachers for printing their statements and names on the testimonial insert. The research team reviewed the testimonials and selected those that communicated perceptions that CT was simple to use, compatible with classroom procedures, more effective than other current instructional materials on smoking prevention and easy to try [8]. Common themes of these testimonials included favorable reactions by students to the interactive and self-paced quality of the program, teacher's

appreciation of the engaging quality of the program, positive evaluation by teachers regarding the accuracy of the information and reports that the program fit into the health education curriculum and operated well on school computer technology. A two-panel insert was designed that contained 11 testimonials and it was inserted into the brochure.

Record of visits to CT website

Visits to the CT website were recorded using a registration screen. This screen appeared when the teacher or student first visited the website and required them to create a unique user name for entry into the CT program. The registration page contained a drop-down menu of all Colorado primary and secondary schools from which the visitor selected their school. User name and school name were linked in a database on CT in order to record each visit from a teacher or student at a school. Beyond this information, the teacher and student names were not known to the researchers. From the utilization records in the database, the number of visits by each teacher and student at a school was observed and an outcome measure created that indicated whether a teacher or student at each school had visited the website or not. This measure avoided counting the same user more than once if he/she visited the website multiple times. It also did not assess the extent of use of the website by individuals at a school.

Post-test survey

Secondary outcome measures were collected by conducting a telephone survey with one teacher or administrator at the schools that were sent the promotional materials. Interviewers asked to speak with the lead teacher who taught 'Health Education'. The secondary outcome measures were perceived prevalence of smoking among their students, attitudes toward student tobacco use and school tobacco use prevention, recall and readership of the promotional materials on CT, attempts to use CT, intentions to use CT, reasons for using or not using CT and evaluation of CT. These questions were modified from a previous study on dissemination of instruction materials on sun protection [29].

Previous training to use CT

In 2002–03, the researchers had conducted seminars for teachers throughout the state in how to use CT in their classrooms [28, 29]. Schools from which at least one teacher was trained to use CT in these seminars were identified ($n = 42$) and this information was included as a potential covariate.

Analysis plan

Linear mixed models were used to account for the clustering of responses within region in the group-randomized design [30]. Degrees of freedom also were adjusted using a Satterthwaite method and adjusted (least-squares) means are reported where appropriate. First, associations between outcome measures and potential covariates (i.e. teacher at school attended a training on CT in the past, urbanization, per capita income, percent of students receiving free/reduced lunch, percent of white students, number of students) were examined with correlation analyses and adjusted analyses were conducted including those covariates that demonstrated significant associations with the outcome measures. Main effects of each two-level factor were tested along with their interaction in this fully crossed factorial design. With only two levels for each factor, the main effect tests represented planned contrasts testing the hypotheses. Descriptive statistics of teacher characteristics were calculated for those who completed the post-test survey.

Results

Six coalitions containing 92 schools were assigned to receive the opinion leader letter and testimonial insert. Eight coalitions containing 125 schools received the testimonial insert only. Six coalitions containing 66 schools were randomized to receive the opinion leader letter only. Finally, nine coalitions with 111 schools received only the brochure with neither the opinion leader letter nor the testimonial insert. Combined, 12 coalitions with 158 schools received the opinion leader letter and 14 coalitions with 217 schools received the testimonial

insert. The decision by four coalition directors not to participate occurred after randomization, producing the imbalance across the cells. See participant flow in Fig. 1.

H1 and H2: website visits

Overall, 6% of schools had at least one visit to the CT website by a teacher, 6% by a student and 9% by a teacher or student (collapsing multiple visits from a school). The percentage of schools in each condition that had a visit was analyzed to test hypotheses one and two that the experimental treatments would each improve program utilization. Prior attendance by a teacher from a school at a seminar on CT was included as a covariate because it predicted more use of CT, $F(1,387) = 7.49, P = 0.007$. A greater percentage of schools receiving the opinion leader letter had at least one visit to the CT website by a teacher (12%) than schools not receiving the letter (4%), $F(1,16.5) = 7.36, P = 0.015$.

By contrast, the testimonial insert did not affect website utilization, $F(1,15.1) = 0.21, P = 0.649$, and the two factors did not display an interaction on utilization, $F(1,17.5) = 2.06, P = 0.168$. None of the treatments influenced the number of schools at which students used the CT website. Also, a greater percentage of schools receiving the opinion leader letter had at least one visit to the CT website from either a teacher or student (15%) than schools not receiving the letter (7%), $F(1,14.6) = 5.30, P = 0.037$, but the testimonial insert, $F(1,12.6) = 0.38, P = 0.550$, and its interaction with the opinion leader letter, $F(1,15.1) = 1.83, P = 0.196$, did not affect utilization of the CT website. Taken together, these data confirmed the first hypothesis but did not confirm the second one.

Post-test survey outcomes (secondary outcomes)

Overall, interviews were completed with a teacher at 226 of the 394 schools (61%, one teacher

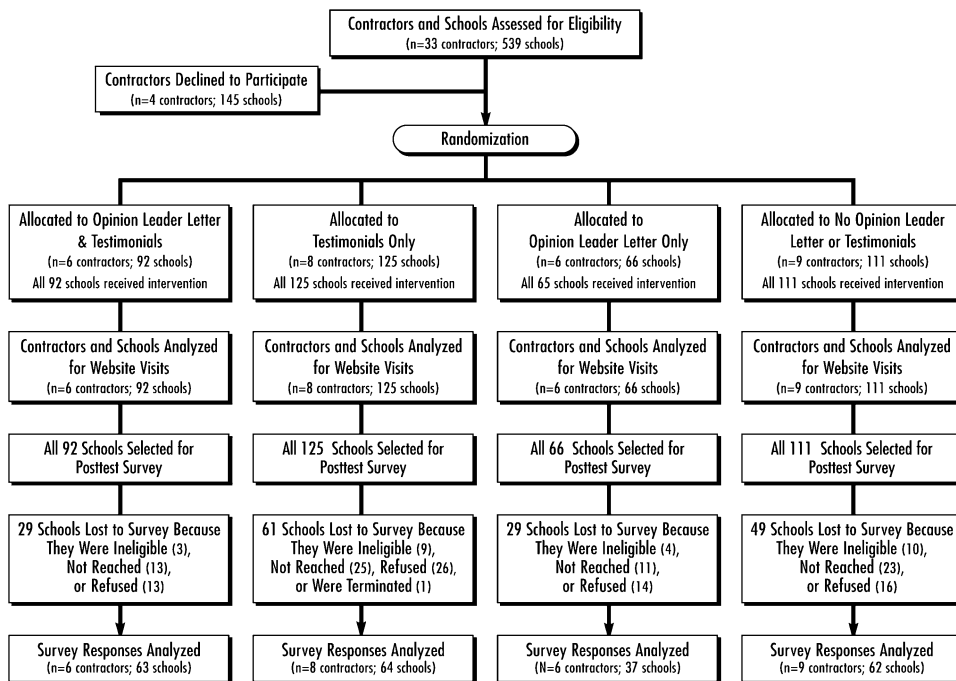


Fig. 1. Participant flow from enrollment to analysis.

interviewed per school). Among the teachers interviewed, the mean age was 43 years; 87% were white, 2% were black, 1% were Asian/Other Pacific Islander and 1% were Native American/Alaskan Native (7% identified as Hispanic or Latino); 2% had at least a high school diploma, 70% a college degree and 28% a postgraduate degrees and 61% were female. Also, 13% of the teachers interviewed had smoked at least 100 cigarettes in their life. By group, 63 teachers were at schools that received the opinion leader letter and testimonial insert, 37 teachers, opinion leader letter only, 64 teachers, testimonial insert only and 62 teachers, neither opinion leader letter nor testimonial insert. Response rate did not differ by whether a teacher at the school had been trained in the past use CT (Fisher's exact test, $P = 0.248$).

H3: evaluation of CT

Principal components factor analysis with orthogonal rotation was conducted on the eight items assessing teachers' evaluation of characteristics of CT that according to the DIM should be associated with adoption. Three factors emerged with loading exceeding 0.50. The first factor included four items measuring perceived ease of using CT [difficult to use (recoded), too simple, appropriate for my students, convenient to use; α reliability = 0.68]. The last two factors each contained two items, assessing fit with the health education curriculum (would take time away from other more important instructional topics, would improve our existing health education curriculum; $\alpha = 0.59$) and capability with the overall school curriculum (compatible with curriculum used in my school, fits with our curriculum standards; $\alpha = 0.60$).

Teachers held a generally favorable impression of the ease of using CT (mean = 2.38; rating of 1 was most favorable and 5 was least favorable), its fit with the health education curriculum (mean = 2.05) and its compatibility with the overall school curriculum (mean = 2.07). However, the experimental treatments had almost no impact on teachers' perceptions of CT. There were no significant effects on how well CT fits with the overall school

curriculum [letter $F(1,63) = 1.63$, $P = 0.206$; testimonial insert $F(1,63) = 2.97$, $P = 0.090$; letter by insert $F(1,63) = 0.94$, $P = 0.336$; adjusted for perceived importance of teaching children not to use tobacco $F(1,63) = 9.97$, $P = 0.002$], ease of using CT [letter $F(1,28.2) = 0.41$, $P = 0.526$; testimonial insert $F(1,27.5) = 0.04$, $P = 0.842$; letter by insert $F(1,27.8) = 0.02$, $P = 0.894$; adjusted for ease of getting time in school computer laboratory for health classes $F(1,59.7) = 7.08$, $P = 0.010$] or fit of CT into health education curriculum [letter $F(1,64) = 0.45$, $P = 0.507$; testimonial insert $F(1,64) = 2.02$, $P = 0.160$; letter by insert $F(1,64) = 0.36$, $P = 0.553$]. Self-reported use of CT was unrelated to evaluations of its fit with the school curriculum [$F(1,66) = 1.05$, $P = 0.3097$], with health education curriculum [$F(1,66) = 0.71$, $P = 0.4023$] and ease of use [$F(1,62.7) = 0.23$, $P = 0.6320$]. Thus, there was no support for hypothesis three that endorsement by opinion leaders and testimonials from teachers would improve teachers' impressions of the characteristics of CT.

When asked, 39% of teachers said that the school was likely to use CT in the classroom before the end of this school year. A greater proportion of teachers at schools receiving the testimonials said that CT was likely to be used (49%) than at schools not receiving them (35%), $F(1,21.8) = 4.44$, $P = 0.047$ [letter $F(1,24.1) = 0.44$, $P = 0.515$; letter by insert $F(1,24.4) = 1.20$, $P = 0.283$].

H4: readership of promotional materials

Overall, 32% of teachers recalled receiving the promotional mailings about CT and 23% reported that they read or looked into them. Neither the opinion leader letter, $F(1,22.4) = 2.55$, $P = 0.124$, nor the testimonial insert, $F(1,20.4) = 2.37$, $P = 0.139$, affected teachers' recall of the receipt of the promotional materials on CT [letter by insert $F(1,23.2) = 1.81$, $P = 0.191$]. However, there was a near-significant trend toward greater readership of the promotional materials in schools receiving the testimonial insert (29%) than at schools not receiving it (22%), $F(1,23.2) = 3.96$, $P = 0.059$, but the opinion leader letter (29%) did not affect

readership [letter = 29%, no letter = 22%; $F(1,26) = 3.28, P = 0.082$]. Hence, hypothesis four was supported only for testimonials. Readership appeared to be especially low in schools not receiving either the opinion letter or the testimonial insert but this interaction was non-significant [$F(1,26.2) = 3.24, P = 0.083$; letter plus testimonial = 26%, letter only = 32%, testimonial only = 32%, neither = 13%].

Discussion

Endorsement by opinion leaders and testimonials from teachers appeared to improve dissemination of the web-based smoking prevention program to public schools, but in different ways. Opinion leader endorsements induced teachers to use the website, which was the ultimate goal of our dissemination effort. Earlier adopting teachers are usually open to influence by outside individuals such as local tobacco control coalition directors, because they routinely scan the environment for new products [31–34]. Moreover, they rely on a local source for information on new programs with which they are unfamiliar to reduce uncertainty in decision making. Teachers should find the directors' knowledge of local tobacco use environments and trustworthiness persuasive.

By contrast, testimonials improved teachers' exposure to the promotional materials and intentions to use CT. Teacher testimonials provided real-world examples of how CT is used by others who hold similar jobs [8]. Surprisingly, testimonials did not stimulate program use. Testimonials may capture the attention of recipients because they contain characters and stories with which recipients can identify and thereby increase their engagement [35]. While identification with characters in narratives has influenced health behavior [15, 36], the short testimonials in this study may have been insufficient to do much more than pique the interest of teachers in the program. Testimonials also may need to be repeated more often to build purchase interest [37]. Some of the program characteristics highlighted in the testimonials may

have been irrelevant to school personnel who read them, even though theoretically, they should have affected decisions to adopt CT. Past research suggests that recipients employ decision heuristics that an alternative (i) chosen by another person for reasons irrelevant to them is a cue that it is unattractive or (ii) that provides greater value to other individuals with dissimilar preferences should be avoided [25]. Testimonials should be pre-tested to ensure that they are relevant to school personnel.

The number of schools where teachers or students visited the CT website was relatively small, overall. On the one hand, the promotional strategies were only modestly effective. However, data on direct marketing efforts indicate that average response rates are extremely low—about 2% [38]. A recent study utilizing direct mail to promote websites with information on a sun-protection curriculum generated visits from only 2% of elementary schools and child care facilities [29]. By comparison, the response to the CT promotional mailing was higher, perhaps because school personnel recognized a need to address smoking initiation and the state banned smoking at schools. Perceived need is the first step in adoption of an innovation by organizations [8].

Several barriers can exist for the adoption of a web-based smoking prevention program. These include too few computers or restricted access to computer laboratories, lack of or ineffective IT support, limited teacher computer skills and questionable reliability of Internet connections [28]. These will not be solved through clever use of message strategies. Instead, they will require additional infrastructure that depends upon the generosity of taxpayers. Despite these barriers, the endorsement of a health education program by local opinion leaders appeared to induce teachers to try it. However, the differences were relatively small. The group-randomized design created a very conservative test of the message strategies because the analysis was adjusted for clustering. This method did reduce the possibility of contamination among schools.

Several limitations in this study deserve mention. It was conducted in a western intermountain state.

Other states may have instructional procedures or computer infrastructures that make dissemination easier (e.g. more computers, better support, more well-trained teachers) or more difficult (e.g. less local control over instruction). They may or may not have local tobacco control opinion leaders. Second, teachers who were interviewed may not have received the promotional materials; the addressee was simply 'Health Educator/School Nurse/Principal'. Alternately, teachers may have remembered promotional mailings from a project conducted 2 years earlier where training seminars on CT were offered statewide, but there was no association of seminars attendance and evaluations of CT. Fourth, the measure of receipt and readership may be affected by social desirability biases and memory errors (failing to recall exposure when interest is low) [26]. Another limitation was the anonymity of users of the CT website and the self-report of school name. A registration system that identified users by name could be a barrier to use and reduce the external validity of the results. Still, users' could have misreported the name of their schools. However, the record of use from the website is more objective and less open to these biases than a self-report of use. The effects of the promotional mailings may have been short-lived and memory for, and positive reactions to, them may have dissipated by post-test [26]. Finally, the message strategies were operationalized in essentially a single exemplar. Some researchers have argued that tests of message designs have greater validity when multiple exemplars are presented and random effects models are used [39].

The dissemination of prevention programs to organizations such as schools has been studied less frequently than the diffusion of health behaviors to individuals [8]. This is a clear oversight, since organizational intermediaries are essential actors in the delivery of health education programs. Purposeful diffusion efforts have been explored less often than observation of naturally occurring dissemination. Research into these issues is essential to insure that effective programs developed through the nation's investment in health education research actually reach the people who are at risk.

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Conflict of interest statement

None declared.

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