



Published in final edited form as:

Am J Prev Med. 2010 July ; 39(1): 53–62. doi:10.1016/j.amepre.2010.03.008.

Mass Media Interventions to Reduce Youth Smoking Prevalence

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Abstract

Background—Mass media interventions for reduction of youth cigarette smoking have been recommended based on a broad array of evidence, although few randomized community trials have been reported.

Design—Four matched pairs of independent media markets were identified; one member of each pair was randomized to receive the intervention. School surveys were conducted in all markets, in 2001 before ($n=19,966$) and in 2005 after ($n=23,246$) the interventions were completed.

Setting/Participants—Grade 7–12 students from public schools in these eight medium sized metropolitan areas participated in the summative evaluations; grades 4–12 students were targeted to receive mass media interventions in four of these markets.

Intervention—Four simultaneous campaigns consisting of specially developed messages based on behavioral theory and targeted to defined age groups of racially and ethnically diverse young people were placed in popular TV, cable, and radio programming using purchased time for 4 years.

Main Outcome Measures—Prevalence of youth smoking and psychosocial mediators of smoking.

Results—No significant impacts of these interventions on smoking behaviors or mediators were found for the overall samples. A positive effect was found for one mediator in subgroups. Among Hispanic participants a marginally favorable effect on smoking prevalence, and significant effects on mediators were found. General awareness of smoking prevention TV messages was slightly higher over time in the intervention areas.

Conclusions—Mass media interventions alone were unable to induce an incremental difference in youth smoking prevalence, likely due to a relatively strong tobacco control environment that included a substantial national smoking prevention media campaign.

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No financial disclosures were reported by the authors of this paper.

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Introduction

Cigarette smoking among young people is an important public health issue because of the serious health consequences of a lifetime cigarette smoking habit. Despite several years of decline, use of cigarettes in the past 30 days was estimated in the U.S. to be about 6% for Grade 8, 13% for Grade 10, and 20% for Grade 12 students during 2009.¹ Cigarette use has risen sharply among young people in many other countries.² In view of these concerns, continued improvement in methods to reduce youth smoking is important.

The range of methods capable of reducing youth smoking includes policy strategies that change environmental contingencies and educational and mass media strategies designed to directly influence knowledge, beliefs, skills, and social norms. Policies that raise cigarette prices have a substantial impact on youth smoking.³ Evidence for the impact of educational strategies is not as consistent in demonstrating long-term effects,^{4,5} Mass media campaigns are among the strategies most often recommended for tobacco control because of the strength of the evidence of effectiveness and the large population impact of even small individual changes that may result.^{6,7,8,9–12} There is probably a need for all of these approaches since policy success depends on supportive populations, and individual decisions about smoking are influenced by well-targeted policies.

A previous study conducted during the late 1980s demonstrated positive effects on youth smoking prevalence of a combined mass media– and school-based intervention.¹³ The present study tested the impact of similar mass media interventions without a dedicated school intervention in an environment that featured a broader array of tobacco control activity at the national, state, and local levels. Theory-based hypotheses for this study¹⁴ stated that the interventions would decrease perceptions of smoking prevalence among young people; increase perceptions of disapproval; increase confidence in ability to refuse cigarettes; decrease positive outcome expectations for smoking; increase negative outcome expectations; and decrease prevalence of self-reported smoking. These hypotheses also were framed as educational objectives for the media messages used in the interventions.

Methods

Four matched pairs of medium sized metropolitan areas (Designated Market Areas, or DMAs) were identified in four states (Florida, South Carolina, Texas, and Wisconsin). These DMA pairs were selected as best matches based on population size, media resources, household income, adult educational attainment, and representation of African American, Hispanic, and non-Hispanic white youth. Recruitment of school districts within DMAs focused on districts serving lower-income and education populations. One member of each DMA pair was randomized to receive the media interventions. Four simultaneous age-specific media campaigns for young people in Grades 4–12 were designed and implemented over a 4-year period in the intervention DMAs during 2002–2005. Similar populations of young people in the four comparison DMAs did not receive the interventions.

Intervention impact was assessed through Grade 7–12 classroom surveys in all eight DMAs in 2001, before the interventions, and in the same schools 4 years later. Based on the clustered sample design the required number of students participating in each survey was 2,500 per DMA. This sample size provided 85% power to detect a 6% net difference in smoking rate changes using a one-sided test at a 5% significance level. All results were based on two-sided tests since the impact assessments included mediators and secondary outcomes. Procedures involving human subjects were reviewed and approved by the IRB at the University of Vermont.

Intervention Design

The intervention target population was segmented into three groups, Grades 4–6, 7–8, and 9–12, because of the strong impact of age on youth preferences for media messages.¹⁵ Smoking prevention campaigns were targeted toward each age group in 2002–2005, and a cessation campaign targeted Grades 9–12 smokers during 2002–2004. Message preferences differences for boys and girls, and substantial proportions of African-American and Hispanic youths in the audiences also influenced message presentation style and casting. A common set of educational objectives consistent with the mediator hypotheses guided the three prevention campaigns. These objectives were (1) decrease perceptions of smoking prevalence among young people; (2) increase perceptions of smoking disapproval; (3) increase confidence in ability to refuse cigarettes; (4) decrease positive outcome expectations for smoking; and (5) increase negative outcome expectations for smoking. A similar set of objectives guided the cessation campaign.¹⁶ All campaigns consisted solely of original messages created to address these objectives and were not linked with other interventions in schools or communities.

Message development—A diverse group of 15 production companies developed 30- and 60-second TV or radio message concepts based on the educational objectives and briefing materials on media preferences and tobacco use perceptions derived from focus groups representing each targeted age level.¹⁷ These producers were skilled in communicating with Hispanic, African-American and Caucasian populations, and were based in Texas, Florida, California, New York, Pennsylvania, and Vermont. Message concepts were reviewed by panels of social scientists and media experts to ensure adherence to the educational objectives, avoidance of unintended messages, and likely appeal to audiences. Selected concepts were developed and tested with diverse youth audience samples in Texas, Florida and Vermont. Messages generally represented the major racial/ethnic groups receiving the campaigns, with about one third of the messages reflecting a Hispanic casting and lifestyle, one third African-American, and one third Caucasian. Sample messages are presented in Table 1. Multiple formats for these messages included dramas, comedies, testimonials, and cartoons. Approximately ten messages were chosen for each campaign in 2002 based on strong endorsements by test audiences and balanced coverage of objectives and audience segments defined by age, gender, and race/ethnicity. Five additional messages were developed annually for each campaign in 2003–2005 to replace messages with declining audience appeal based on annual monitoring surveys conducted with about 300 students in each intervention DMA.

Message placement—Messages were placed using purchased time in intervention DMA media accessing the largest number of youth at each age level. Monitoring surveys were used to select programming rated highest by each age group, gender, and race/ethnicity subsegment in each market. Specific TV channels and programs and radio stations used by each gender and race/ethnicity group at each age level were selected in each market to maximize exposure to messages for youth having these characteristics. Message placement plans were revised annually to respond to changes in media availability and youth preferences.

Campaign weight—For each of the three prevention campaigns approximately half the number of placements of the earlier intervention study were scheduled.¹³ With exposure overlap among these campaigns, viewers were estimated to receive the approximate weight of the previous intervention, an average of 380 gross rating points (GRP) or 3–4 exposures per week. This is in the range of other prevention¹⁸ and commercial campaigns.¹⁹ The fourth campaign had a weight of 380 GRP.¹⁶ For all campaigns these concentrations were placed during January–May and August–September. During June–July, radio campaigns delivered approximately 215 GRP.

Data Collection

Summative surveys conducted in Grade 7–12 classrooms in all eight DMAs were administered by professional teams following protocols developed by the investigators. Parents provided active consent. The two summative surveys were nearly identical in content, but differed in one notable feature. In 2001, students provided contact information on a cover sheet that was removed and stored separately before the survey began; this information was used later to recruit smokers for a separate evaluation. The 2005 survey was fully anonymous.

Measures

Intervention effects were assessed using standard smoking behavior measures and theory-based assessment of psychosocial mediators. Mediator measures were focused on the educational objectives used to create messages. The measurement formats were based on previous development studies; content of each measure was confirmed using factor analysis methods and baseline survey data.²⁰

Smoking status and intentions—A single-item measure of 30-day smoking prevalence used in national Youth Tobacco Survey (YTS) assessed smoking status.²¹ A parallel measure assessed 7-day smoking prevalence. Single-item measures from the YTS assessed intentions to smoke.

Psychosocial mediators—The 4-item measure assessing Perceived Community Peer Smoking Prevalence (e.g., “Percent of girls your age in your community who smoked a cigarette in the past thirty days”) had an internal consistency reliability coefficient alpha of 0.88. The 4-item measure of Perceived U.S. Peer Smoking Prevalence (e.g., “Percent of boys your age in the U.S. who smoked a cigarette in the past thirty days”) had alpha=0.90. The 11-item Perceived Peer Smoking Norms measure (e.g., “What does your best male friend think about boys your own age smoking cigarettes?”) had alpha=0.92. The 12-item Confidence in Refusing Cigarettes measure (e.g., “How hard or easy would it be to refuse a cigarette in a friend’s house when no adults are there?”) had alpha=0.94. The 13 item Negative Outcome Expectations measure (e.g., “If I smoked a cigarette I would hurt my reputation”) had alpha=0.88. The 12 item Positive Outcome Expectations measure (e.g., “If I smoked a cigarette I would feel more relaxed”) had alpha=0.85.

Process measures—The follow-up survey included aided recall measures for messages used in the most recent campaigns; these measures described a message briefly, then asked about frequency of seeing or hearing and for evaluation of the message. Both summative surveys also included seven single-item measures of general awareness of tobacco reduction messages from multiple independent sources.

Statistical Analyses

Data collected before and after the 4-year intervention provided cross-sectional observations at two points in time. Because age distributions differed in the pre- and post-test surveys, adjustments for grade in school (middle versus high school) were included in the analyses. The approach was based on the General Linear Mixed Model, incorporating adjustments for the group-level randomization, modeled as follows:

$$Y_{i,jk:l} = \mu + \beta_0(X_{oi,jk:l} - \bar{X}_o) + C_l + T_j + TC_{jl} + S_p + CS_{lp} + TS_{jp} + TCS_{jlp} + \varepsilon_{i,jk:l}$$

where $Y_{i,jk:l}$ is the observed value for the i^{th} member nested within the k^{th} group and the l^{th} condition observed at the j^{th} time; μ is the grand mean; and $\beta_0(X_{oi,jk:l} - \bar{X}_o)$ is the adjustment for grade level of the respondent. There are three fixed effects: C_l is the effect of the l^{th}

condition, $l=1, 2$; T_j is the effect of the j^{th} time, $j=1,2$; and TC_{jl} (the intervention effect) is the joint effect of condition and time. Included also were five random effects accounting for the expected intraclass correlations among members within states (S_p , $p=1, 2, 3, 4$), among members within the Condition \times State cells (CS_{lp}), within the Time \times State Surveys (TS_{jp}), and within the Time \times Condition \times State Surveys (TCS_{jlp}), and random variation among the members ($\varepsilon_{i,jk:l}$). Confounding between grade level and school precluded the ability to cluster at the school level. Group effects and the Time \times Group interaction normally included in similar models cannot be estimated separately from the CS_{lp} and TCS_{jlp} effects because only a single group was represented in each combination of time, condition, and state.²² The time required for model convergence for the generalized mixed model was extreme. Thus, analyses of both continuous and dichotomous outcomes employed a general linear mixed model.²³ Results are from models in which the covariance parameters were constrained to be positive due to the time required for convergence when relaxing this constraint. While all analyses included effects outlined above, only the raw SD estimates are reported. Analyses were performed using SAS, version 8.01.²⁴

Results

The 2001 baseline survey was completed by 19,966 of 30,499 eligible students attending 99 middle and high schools in the eight DMAs; response rates were similar in intervention (61.3%) and comparison (69.7%) DMAs. The 2005 follow-up survey was completed by 23,246 students attending 98 of the same schools with response rates of 80.2% for intervention and 82.9% for comparison DMAs. Differences in data collection processes described in the methods section and improved implementation of parental consent procedures over 5 years of survey experience in these schools contributed to higher follow-up survey response rates. Overall distributions by grade, gender, and race/ethnicity did not differ between conditions at either survey (Table 2).

Smoking Behavior and Intentions

Analyses of intervention impact on adolescent cigarette use in the past 30 days did not show an effect, as reflected in results for the Condition \times Time factor in Table 3. The 30-day smoking rates appeared to decline over the 4-year interval between the baseline and follow-up surveys for participants in both conditions, but this trend was not significant as shown by the Time factor results. Similar results were obtained for 7-day prevalence and for smoking intentions.

Psychosocial Mediators

Assessments of impact on psychosocial mediators did not show an effect of the interventions in the overall sample, as reflected in the Condition \times Time factors (Table 3). Results for factors reflecting change over time independent of possible media intervention effects showed significant favorable changes in both study groups for Perceived Prevalence and Peer Norms, and a favorable trend for Confidence. Positive Outcome Expectation scores increased significantly over time in both study groups, an unfavorable change. Negative Outcome Expectations may have decreased in the Comparison but not in the Intervention group, although this difference was not significant.

Impact on Subgroups

Among Grade 7–8 students a significant favorable intervention effect was found for Negative Outcome Expectations ($p=.03$); a similar trend was found among Grade 9–12 participants. A significant favorable effect for this mediator also was found among African Americans ($p=.05$). Favorable impact trends among female ($p=.14$) and male ($p=.11$) participants were consistent with this effect.

Among Hispanic adolescents a favorable intervention trend was found for 30-day smoking ($p=.09$). Prevalence fell from 26.2% to 18.9% in intervention DMAs while falling from 18.1% to 15.9% in comparison DMAs, for an intervention group advantage of -5.1% (Table 4). Favorable trends or effects were found for Perceived Prevalence in Community ($p=.05$), Perceived Prevalence in the U.S. ($p=.07$), Perceived Peer Norm ($p=.02$), Positive Outcome Expectations ($p=.05$) and Negative Outcome Expectations ($p=.08$). These effects were apparent in each of the two DMA pairs with the largest Hispanic student representation. No similar combination of effects or trends was found for African American youth (Table 5).

Message Exposure

Reported intervention message exposure using aided recall varied by age and medium. Among Grade 7–8 youth from intervention DMAs, 41% recalled seeing any specific TV message from the campaigns, and 32% recalled hearing any specific radio message. For Grade 9–12 youth, 32% recalled any TV message, and 37% recalled any radio message. While 75% who saw a message said they liked it, 38% who saw them three times or more said they liked them “a lot” compared to 18% who saw a message once or twice; similar results were found for radio messages.

General awareness of tobacco control messages on TV was greater in intervention DMAs ($p=.03$; Table 6); these tobacco control message awareness levels were maintained over 4 years while declining in comparison DMAs. A similar trend was found for radio messages. Among the large Caucasian/Other sample, greater message awareness was found for both TV ($p=.02$), and radio ($p=.02$) in intervention DMAs; similar trends were noted among African American adolescents. Hispanic adolescent results suggested an increase in awareness of tobacco control messages on radio in intervention DMAs while declining in comparison DMAs ($p=.10$). No changes in tobacco control message awareness over time were found among the overall study groups for school, friend, parent, newspaper, magazine, or billboard sources of these messages.

Discussion

Results of the experiment provided no evidence that these mass media interventions by themselves had an impact on cigarette smoking prevalence, intentions, or hypothesized mediators in community populations of Grade 7–12 youth. Hispanic student results suggested positive effects. Four matched pairs of media markets in four states were randomized to intervention or control conditions within states. The intervention systematically targeted youth audiences at the ages when young people are most likely to make decisions about cigarette smoking. Messages were placed at a high level of intensity in mass media programming favored by these audiences. Behavioral outcome measures were standard items used in national surveys, and theory-based mediator measures had strong psychometric qualities. The study had moderate statistical power, but data did not suggest that this issue materially affected the results. Methodologic issues did not offer strong explanations for the lack of an intervention impact on the general youth population. Several alternative explanations were considered.

Youth smoking trends

Survey data from this study showed favorable changes in smoking behavior between 2001 and 2005 independent of possible intervention effects. Although the smoking prevalence decline over time for these samples was not significant, this decline is similar to national trends. Youth smoking declined by about 19% from 2001 to 2005 in a large national survey of grades 9–12.²⁵ It is possible that favorable youth smoking trends nationally and in these four states diminished the potential impact of the intervention.

Tobacco control environment

The tobacco control environment in the U.S. changed dramatically through the 1990s, and continued to change throughout the 2002–2005 intervention period. Between 1990 and 2002 state cigarette taxes increased in three of four participating states.²⁶ Clean indoor air, youth access restriction, and similar legislation was enacted shortly before or during the campaigns in three of four states.²⁷ Following the 1998 Master Settlement Agreement (MSA) with the tobacco industry all four states funded tobacco control programs from 2000 through 2005, except for one state that had a gap during 2003–2004. During 2002, the first campaign year for this research project, these states spent an average of 26% of the recommended CDC minimum expenditure on tobacco control programming.²⁸

The CDC estimated that the median number of state-funded anti-tobacco advertising exposures among youth aged 12–17 years increased from 0.04 per month in 1999 to 0.80 in 2002. The amount of estimated exposure to these campaigns in the participating states averaged 0.70 exposures per month in 2003.²⁹ A large national youth-focused anti-tobacco media campaign, also funded by the MSA, was initiated in 2000. This campaign appears to have been active in all of the intervention and comparison DMAs at a high level of intensity throughout the intervention campaigns.³⁰ Evidence of positive effects on smoking-related attitudes and behaviors for the national campaign has been reported among youth aged 12–17 years.³¹

The cumulative effects of these changes most likely reduced the magnitude of tobacco control effects that could be achieved by additional media-based intervention campaigns. The tobacco control context in which the research project was conducted may have contributed to a ceiling effect for mass media-based youth tobacco control intervention. In this context it may have become difficult to achieve further changes in youth smoking with the additional media interventions provided by this study. High reported baseline levels of anti-tobacco TV message exposure are consistent with this perspective (Table 6).

Changing media use/channels patterns

Data from this study indicated substantial migration of youth audiences from major TV outlets to more fragmented cable TV outlets. Although a 380 GRP served to characterize the overall campaign weight, it was calculated on reported use of specific channels. In a fragmented media environment it is difficult to gauge viewership since an audience may claim loyalty to any given channel, such as MTV, while investing a smaller amount of time actually viewing that channel.³² Overall use of the radio and TV channels chosen to place the campaign messages declined over the course of the study, and web and personal entertainment media offered rapidly expanding competition for youth attention.³³ This was a substantial change from the youth media environment in the late 1980s when a successful intervention benefited from using media markets dominated by three networks and youth attention was concentrated on a limited set of offerings.¹³

Intervention strategy

The intervention strategy was adapted from a successful model that included a school-based smoking prevention program that shared identical objectives.¹³ The investigators elected to test the impact of a media intervention without a school component because schools generally committed to some form of tobacco or substance abuse curriculum in the 1990s; these curricula often shared key elements of the overall approach to substance use prevention used to create the current media interventions. It is possible, however, that lack of close integration of the media campaigns with school or community programs reduced the impact of the intervention.

Conceptual framework

Messages created for these interventions were based on a social cognitive theory framework. Many of these portrayed young people in familiar situations modeling behaviors and beliefs promoting nonsmoking. Repeated use of this strategy may have blunted the novelty of these messages. It is not clear that other approaches have advantages over the one used here.^{9,10} It is clear, however, that the ability of messages to stand out and make a distinct impression in the increasingly competitive marketplace of media directed toward young people may be crucial in executing future campaigns.

Study design

Randomized community trials to evaluate health communication interventions can be vulnerable to rapidly changing environments that influence all study groups. Strengths and limitations of this approach, and adaptations and alternatives, should be considered in planning evaluations of tobacco control media interventions.^{34,35}

Outcome expectations

Baseline levels of beliefs in Negative Outcome Expectations were maintained for intervention groups, while they eroded among control groups. This suggests that Negative Outcome Expectations could be emphasized when designing campaigns seeking to maintain a nonsmoking norm. A broader issue was raised by an unfavorable trend for Positive Outcome Expectations. A shift toward more Positive Expectations and fewer Negative Expectations may undermine advances in youth smoking reduction. These results could be linked to reduced awareness of tobacco control messages on radio and TV found in this study (Table 6), and to simultaneous decreases in tobacco prevention program investment and increases in tobacco industry marketing expenditures during this time.^{29,36}

Hispanic youth effects

Evidence of an effect on Hispanic youth could be explained by the novelty and relevance of campaign messages targeted to this underserved audience. Several messages in each annual campaign had a concentration of Hispanic lead actors and cultural themes that may have engaged the attention of Hispanic youth. Results for this group showed favorable effects for 30-day smoking prevalence and most mediators. The distinctiveness of smoking prevention and cessation messages designed for their interest may have been key factors.

Implications

Previous research provides good evidence that well-targeted media interventions can have a substantial impact on use of cigarettes by young people. It has been unclear what impact a highly active tobacco control environment might have on this effectiveness. It also has been unclear what the possible effects might be among youth of various age, gender, and race/ethnicity groups. The current study informs each of these questions.

It is possible that the tobacco control environment in which this experiment was conducted presented such a strong array of environmental influences on young people that the additional mass media interventions from this study had no impact. If a substantial mass media-based youth tobacco control program is already in place, planners would be advised to carefully assess the potential value of investment in additional mass media programming. While other evidence supports the inclusion of a strong mass media component in comprehensive tobacco control programs, there may be an upper limit to media effects. Future media campaigns also will need to incorporate innovative targeting methods, including a broader array of media, and flexibility to shift resources as new media exposure opportunities emerge.

Some evidence of success in reaching Hispanic youth provides insight into methods of designing messages to appeal to important audience subgroups. Credible actors, lifestyle portrayals and message content relevant to that group appeared to be important in achieving these effects. It is possible that the freshness of this approach to Hispanic youth resulted in greater attention to and acceptance of these messages. These results reinforce the importance of customizing message content to distinctive audiences and of creating novel message content and styles.

Conclusion

A cluster randomized, multi-community test of the impact of intensive mass media interventions over 4 years was not effective by itself in reducing youth smoking prevalence at a greater rate than the favorable trends seen in the U.S. during that time. A relatively strong tobacco control environment, including a substantial national media campaign concurrent with these interventions, and a rapidly changing set of media choices likely affected the results. These findings suggested the importance of balancing mass media approaches with other youth smoking prevention and cessation strategies and flexible and imaginative use of new media opportunities.

Acknowledgments

This study was supported by a grant from the National Cancer Institute (P01 CA82708). The contributions of Anne L. Dorwaldt MA, Greg S. Dana MPA, and Kathleen Howe for implementation of the intervention program; James Ross, Alice Roberts, and Carolyn Ramage of ORC Macro for implementation of the classroom surveys; the participating school districts, students, parents, and teachers; and anonymous reviewers are gratefully acknowledged.

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Table 1

Examples of messages reflecting lifestyles of African-American, Hispanic, and Caucasian youth.

African-American messages
<i>Sister, Sister.</i> Two African-American teenage sisters shoot hoops at a city playground when a boy comes along, saying, “you wanta smoke?” The older sister fires the ball at him, saying, “you want to play?” and it bounces off his cigarette. She says, “you can’t do both,” then she shoots a three-pointer, getting a “high five” from her sister.
<i>The Rap.</i> An African-American dad and son drive in a car while a rap sends the message that the dad’s addiction to smoking not only hazards the father’s health, but also sets a bad example for his son.
Hispanic messages
<i>Coolness Checklist.</i> With a fast-paced Latin rhythm, Juan mingles with the crowd in a schoolyard as a narrator says he’s cool because he wears the right gear, is a good student, is nice to girls, is cool with the guys and he doesn’t smoke. When Juan refuses a cigarette, friends comment that he did the right thing.
<i>Out with Big Brother.</i> A group of Hispanic boys come out of the movies, and an older kid bullies a younger boy when he refuses a cigarette. The boy’s big brother is in the group, and when his little brother stands up to the bully, he says he’s cool, and wishes he had refused cigarettes when he was his age. The little brother smiles and says, “thanks, brother.”
Caucasian messages
<i>Don’t Miss It.</i> At a teen house party, a good-looking guy keeps trying to light up but is put off first by attractive girls and then by the host who says he’ll have to smoke outside, while showing him out the back door. The smoker is left standing in the dark as the porch light goes out.
<i>Swimming Lessons.</i> Three girls lounge in bathing suits by a public pool, and one says she’s stressed, and takes out a cigarette. The other two try to talk her out of smoking when the handsome male swimming instructor comes along, and she decides to take swimming lessons instead.

Table 2

Comparison of summative survey participant characteristics by study condition.

Characteristic	Baseline Survey			Followup Survey		
	Comparison (n=10412) n (%)	Intervention (n=9544) n (%)	p	Comparison (n=11385) n (%)	Intervention (n=11860) n (%)	p
Grade in school						
7	1401 (13.5)	1814 (19.0)	0.56	2616 (23.0)	2498 (21.1)	0.55
8	2363 (22.7)	2071 (21.7)		2544 (22.3)	2390 (20.2)	
9	2126 (20.4)	2211 (23.2)		1959 (17.3)	2695 (22.8)	
10	1982 (19.0)	1777 (18.6)		1797 (15.8)	1876 (15.8)	
11	1542 (14.8)	905 (9.5)		1322 (11.6)	1138 (9.6)	
12	998 (9.6)	765 (8.0)		1137 (10.0)	1243 (10.5)	
Gender						
Male	4765 (45.9)	4391 (46.2)	0.77	5345 (47.1)	5652 (47.9)	0.56
Female	5612 (54.1)	5114 (53.8)		6008 (52.9)	6140 (52.1)	
Race/ethnicity						
African-American	2460 (23.6)	2177 (22.8)	0.07	3056 (26.8)	2869 (24.2)	0.56
Hispanic/Latino	1371 (13.2)	1350 (14.1)		1647 (14.5)	1765 (14.8)	
Non-Hispanic Caucasian	6074 (58.3)	5462 (57.2)		6117 (53.7)	6313 (53.2)	
Other, unknown,>1 race/ethnicity	507 (4.9)	555 (5.8)		565 (10.0)	913 (7.7)	

Table 3

Assessment of intervention impact on cigarette smoking status, intent to smoke, and targeted psychosocial mediators.

Variable	Baseline Survey			Follow-up Survey			p	
	Comparison	Intervention	Comparison	Intervention	Comparison	Intervention	condition	time
Smoked in past 30 days; <i>n</i> (%) ^d	1846 (17.8%)	1797 (18.9%)	1750 (15.5%)	1994 (16.9%)	0.63	0.15	0.15	0.95
Smoked in past 7 days; <i>n</i> (%)	1414 (13.6%)	1429 (15.0%)	1314 (11.6%)	1540 (13.1%)	0.54	0.10	0.10	0.80
Intention to smoke in the next 30 days; <i>M</i> (SD) ^b	3.52 (0.90)	3.47 (0.93)	3.56 (0.86)	3.54 (0.88)	0.57	0.08	0.08	0.56
Intention to smoke in the next year; <i>M</i> (SD)	3.34 (0.99)	3.29 (1.00)	3.40 (0.94)	3.38 (0.97)	0.62	0.07	0.07	0.65
Intention to smoke in the next 5 years; <i>M</i> (SD)	3.47 (0.76)	3.43 (0.78)	3.50 (0.76)	3.47 (0.78)	0.60	0.04	0.04	0.62
Perceived Prevalence in Community; <i>M</i> (SD) ^c	47.06 (20.86)	47.39 (21.66)	45.24 (21.27)	44.53 (21.86)	0.94	0.02	0.02	0.35
Perceived Prevalence in the U.S.; <i>M</i> (SD)	61.85 (19.51)	61.77 (20.04)	59.65 (20.62)	58.82 (20.98)	0.83	<0.01	<0.01	0.45
Peer Norm; <i>M</i> (SD) ^d	1.64 (0.64)	1.67 (0.65)	1.59 (0.62)	1.58 (0.64)	0.92	0.04	0.04	0.38
Confidence to refuse; <i>M</i> (SD) ^e	2.58 (0.53)	2.58 (0.54)	2.61 (0.54)	2.60 (0.54)	0.79	0.14	0.14	0.99
Positive Outcome Expectations; <i>M</i> (SD) ^f	1.31 (0.33)	1.32 (0.34)	1.35 (0.37)	1.35 (0.37)	0.77	0.02	0.02	0.25
Negative Outcome Expectations; <i>M</i> (SD)	2.57 (0.40)	2.55 (0.41)	2.54 (0.42)	2.56 (0.42)	0.99	0.32	0.32	0.12

^aThirty-day smoking rates were not significantly different at baseline ($p=.77$).

^bHigher Intention scores indicate lower intention to smoke in the future; score ranges 1–4.

^cPerceived Prevalence scores indicate perceived percentage of peers who smoked in the past 30 days; ranges 0–100.

^dHigher Peer Norm score indicates greater perceived support for smoking; range 1–4.

^eHigher Confidence score indicates greater confidence in ability to refuse cigarette offers; range 1–3.

^fHigher Outcome Expectation scores indicate outcome was perceived as more likely; ranges 1–3.

Table 4

Assessment of intervention impact on Hispanic adolescents.

Variable	Baseline Survey			Follow-up Survey			p
	Comparison	Intervention	Intervention	Comparison	Intervention	Intervention	
Smoked in past 30 days; <i>n</i> (%)	248 (18.1%)	353 (26.2%)	261 (15.9%)	332 (18.9%)	0.15	0.04	0.09
Smoked in past 7 days; <i>n</i> (%)	182 (13.3%)	268 (19.9%)	175 (10.7%)	258 (14.7%)	0.10	0.05	0.26
Intention to smoke in the next 30 days; M (SD)	3.51 (0.82)	3.31 (0.96)	3.53 (0.79)	3.44 (0.88)	0.11	0.09	0.16
Intention to smoke in the next year; M (SD)	3.33 (0.97)	3.10 (1.03)	3.34 (0.92)	3.26 (0.99)	0.13	0.08	0.12
Intention to smoke in the next 5 years; M (SD)	3.38 (0.78)	3.26 (0.84)	3.38 (0.79)	3.33 (0.83)	0.25	0.20	0.21
Perceived Prevalence in Community; M (SD)	47.2 (21.0)	51.8 (21.8)	45.8 (21.3)	47.0 (22.1)	0.01	0.05	0.05
Perceived Prevalence in the U.S.; M (SD)	63.7 (19.8)	64.8 (19.1)	62.5 (20.0)	60.8 (20.7)	0.86	0.04	0.07
Peer Norm; M (SD)	1.65 (0.57)	1.80 (0.61)	1.66 (0.58)	1.66 (0.61)	0.25	0.03	0.02
Confidence to refuse; M (SD)	2.55 (0.52)	2.50 (0.54)	2.57 (0.53)	2.56 (0.54)	0.32	0.07	0.28
Positive Outcome Expectations; M (SD)	1.33 (0.32)	1.39 (0.35)	1.38 (0.35)	1.38 (0.36)	0.08	0.17	0.05
Negative Outcome Expectations; M (SD)	2.55 (0.39)	2.50 (0.42)	2.52 (0.41)	2.52 (0.44)	0.45	0.87	0.08

Table 5

Assessment of intervention impact on African-American adolescents.

Variable	Baseline Survey			Follow-up Survey			p
	Comparison	Intervention	Intervention	Comparison	Intervention	Intervention	
Smoked in past 30 days; <i>n</i> (%)	281 (11.5%)	261 (12.0%)	298 (9.8%)	348 (12.2%)	0.30	0.31	0.60
Smoked in past 7 days; <i>n</i> (%)	228 (9.3%)	217 (10.0%)	254 (8.4%)	284 (9.9%)	0.37	0.44	0.95
Intention to smoke in the next 30 days; M (SD)	3.64 (0.73)	3.54 (0.76)	3.64 (0.74)	3.57 (0.77)	0.34	0.32	0.45
Intention to smoke in the next year; M (SD)	3.47 (0.84)	3.39 (0.87)	3.50 (0.82)	3.43 (0.87)	0.29	0.15	0.61
Intention to smoke in the next 5 years; M (SD)	3.53 (0.74)	3.50 (0.75)	3.53 (0.76)	3.48 (0.79)	0.17	0.78	0.50
Perceived Prevalence in Community; M (SD)	49.1 (22.4)	48.9 (22.8)	48.8 (22.6)	48.7 (23.0)	0.91	0.68	0.84
Perceived Prevalence in the U.S.; M (SD)	66.2 (19.6)	66.3 (20.0)	64.5 (21.2)	63.9 (20.7)	0.57	0.01	0.50
Peer Norm; M (SD)	1.61 (0.59)	1.67 (0.56)	1.63 (0.59)	1.64 (0.61)	0.54	0.90	0.16
Confidence to refuse; M (SD)	2.61 (0.50)	2.61 (0.50)	2.64 (0.52)	2.62 (0.53)	0.64	0.18	0.64
Positive Outcome Expectations; M (SD)	1.34 (0.37)	1.37 (0.36)	1.39 (0.41)	1.41 (0.40)	0.45	0.04	0.47
Negative Outcome Expectations; M (SD)	2.57 (0.43)	2.53 (0.42)	2.51 (0.46)	2.52 (0.46)	0.68	0.02	0.05

Table 6

Reported awareness of tobacco control messages from specific sources for overall study groups.

Variable	Baseline Survey		Follow-up Survey		p		
	Comparison M (SD)	Intervention M (SD)	Comparison M (SD)	Intervention M (SD)	condition	time condition × time	
Discussions in School ^a	3.04 (0.93)	3.00 (0.96)	3.06 (0.96)	3.04 (0.97)	0.75	0.20	0.68
Discussions with Friends	2.22 (0.95)	2.23 (0.96)	2.22 (0.98)	2.24 (0.98)	0.84	0.66	0.72
Discussions with Parents	2.96 (1.04)	2.97 (1.05)	2.99 (1.06)	3.00 (1.06)	0.83	0.23	0.94
Magazines/Newspapers	2.37 (0.97)	2.36 (0.98)	2.34 (1.01)	2.34 (1.02)	0.66	0.50	0.52
Billboards	2.24 (0.98)	2.23 (0.99)	2.24 (1.02)	2.26 (1.03)	0.68	0.85	0.47
Radio Commercials	2.59 (1.02)	2.61 (1.05)	2.44 (1.04)	2.61 (1.05)	0.07	0.57	0.13
TV Commercials	3.07 (0.96)	3.05 (0.97)	2.94 (1.01)	3.03 (0.99)	0.38	0.39	0.03

^aHigher scores indicate higher levels of reported exposure to tobacco control messages from the source category (ranges 1–4).