

Intermediate Outcomes from Project MYTRI: Mobilizing Youth for Tobacco-Related Initiatives in India

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Abstract

The purpose of this article is to present the intermediate results for Project MYTRI, a school-based, multiple component intervention designed to prevent and reduce many forms of tobacco use (chewing tobacco, cigarettes, and bidis) among youth in India. The intervention is based on effective models in the United States "translated" for use in this context. The intervention targets two cohorts of students who were in the 6th and 8th grade when the study started. Thirty-two schools in Delhi (north India) and Chennai (south India) were randomized to receive the intervention ($n = 16$) or serve as a delayed intervention control ($n = 16$). Students in these schools were surveyed before the intervention began and at an intermediate point, 1 year into this 2-year intervention ($n = 8,369$). A test of the changes in risk factors for tobacco use between the baseline and intermediate surveys revealed that, compared with the control, students in the intervention condition (*a*) had better knowledge about the health effects

of tobacco ($P < 0.01$); (*b*) believed that there were more negative social consequences to using tobacco ($P = 0.04$); (*c*) had fewer reasons to use tobacco ($P < 0.01$); (*d*) had more reasons not to use tobacco ($P = 0.03$); (*e*) were less socially susceptible to chewing ($P = 0.04$) and smoking ($P = 0.03$) tobacco; (*f*) perceived fewer peers and adults around them smoked ($P < 0.01$) or chewed ($P < 0.01$) tobacco; (*g*) felt that tobacco use was not acceptable, especially among their peers ($P < 0.01$); (*h*) were more confident in their ability to advocate for tobacco control ($P = 0.03$); (*i*) were more knowledgeable about tobacco control policies ($P < 0.01$); and (*j*) supported these policies, too ($P = 0.04$). Fewer students in the intervention condition reported having intentions to smoke tobacco in the next year ($P = 0.02$) or chew tobacco when they reached college ($P < 0.01$). No changes in actual tobacco use were observed at this stage of the study. (Cancer Epidemiol Biomarkers Prev 2007;16(6):1050-6)

Introduction

An estimated 5,500 youth start using tobacco every day in India (1). Interventions designed to alleviate its effect are complicated by the many forms in which tobacco is consumed. Smokeless tobacco use, like gutkha (an inexpensive chewing tobacco), is most popular among youth followed by cigarette and bidi smoking (a hand-rolled, filter-less cigarette; ref. 2). In a recent (2000-2004) national survey of 13 to 15 year olds in India, ever use of any form of tobacco was reported by >25% of youth and current tobacco use by 17% (2). Tobacco use is especially problematic for youth living in urban settings. Recent findings from our team's current tobacco study in India, called MYTRI (Mobilizing Youth for Tobacco-Related Initiatives in India), show an alarming spike in tobacco use among young adolescents in Delhi and Chennai (3). In a survey of ~12,000 youth conducted in 2004, 6th graders were two to four times more likely to use tobacco than 8th graders (3). This is opposite of that observed in the United States, as tobacco use increases by grade (4). It does not bode well for the future of the tobacco epidemic here and indicates an urgent need for youth-focused intervention.

Project MYTRI is a partnership between prevention scientists in the United States and an NGO in India (Health-Related Information Dissemination Amongst Youth). MYTRI is funded by the Fogarty International Center (2002-2007) as part of a larger initiative to build capacity for conducting tobacco control research worldwide (5). The primary goal of MYTRI is to design, implement, and evaluate the efficacy of a school-based, multiple component intervention to reduce and prevent tobacco use among youth in two large cities in India. The program is based on effective intervention models used in the United States, "translated," appropriately, for use in this context (6). As such, it represents, in a biomedical model, type II translational research most closely, as an adaptation and subsequent extension of prevention programming for use in a novel setting (7). Before MYTRI, no etiologic research about the onset of tobacco use among youth had been done in India. Our model for intervention (Fig. 1) was based on prior models of smoking onset in the West followed by expert review in India and then extensive focus group interviews with students in grades 6 and 8 (the initial target grade levels for the intervention; ref. 8). To develop an appropriate intervention model, we focused on identifying risk factors for the onset (and/or maintenance) of tobacco use that would be amenable to intervention (9). Changing these risk factors (e.g., lack of knowledge about the health effects of tobacco) became the objectives of the intervention model (e.g., increase knowledge about the health effects of tobacco; see Fig. 1). Many of the risk factors were subsequently shown to be correlated with tobacco use among youth in a larger quantitative study (10).

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Intervention components:

- Classroom curricula
- School posters
- Parent postcards
- Peer-led health activism

**Intervention objectives:**

- Increase knowledge about health effects of tobacco use
- Change values, meanings, beliefs about tobacco use
- Increase skills to resist social influences to use tobacco
- Promote tobacco-free social norms in schools and homes
- Increase exposure to healthy, tobacco-free role models
- Provide support for others to abstain/quit using tobacco
- Provide opportunities to support tobacco control policies

**Intervention goals:**

- Prevent/reduce bidi smoking
- Prevent/reduce cigarette smoking
- Prevent/reduce use of chewing tobacco

Figure 1. Intervention model for Project MYTRI.

The purpose of this article is to present the results of the initial evaluation of MYTRI, 1 year into its 2-year intervention program. The focus of the article is on evaluating whether the intervention is changing the risk factors it is targeting, at this stage in the intervention's implementation. In other words, the article presents a test of whether the intervention's objectives are being met (Fig. 1). This is the "primary outcome" of interest at this stage in the study. Without changing these risk factors, or meeting these intervention objectives, we would not expect to change behavior, or meet our goals (Fig. 1). To track progress toward these goals, the article also presents a test of the "secondary outcomes" at this stage of the study, with regard to changes in intentions to use tobacco and tobacco use (including chewing tobacco, bidi, and cigarette smoking).

Materials and Methods

Study Design. Project MYTRI is a group-randomized trial (11). In 2004, 16 schools in Delhi (in northern India) and 16 schools in Chennai (in southern India) were recruited to participate, matched according to type of school (private versus government; co-ed versus boys-only versus girls-only), and then randomly assigned to receive a tobacco intervention program ($n = 16$ schools) or serve as a delayed intervention control ($n = 16$ schools; ref. 6). The 2-year intervention program is implemented over consecutive academic years (2004-2005 and 2005-2006) with two cohorts of students who were in the 6th and 8th grades when the study began. These students are being surveyed thrice to evaluate the effect of the intervention: (a) at baseline, before the intervention began (2004); (b) between year 1 and 2 of the intervention (2005); and (c) after the intervention is done (2006). This study presents the results of the first surveys, in 2004 and 2005. Ethical clearances for the trial were obtained from the Independent Ethics Committee in Mumbai, India and the Institutional Review Board in Minneapolis at the University of Minnesota. The study design is shown in Fig. 2.

Participants. In 2004, all schools enrolled in the study ($n = 32$) participated in the survey; in 2005, however, two schools refused to participate because of conflicting exam schedules (one school did not participate at all and one school only allowed seventh graders to participate). All students enrolled in participating schools in 6th and 8th grade in 2004 ($n = 12,484$) and 7th and 9th grade in 2005 ($n = 12,075$) were eligible and invited to participate in the survey. The response rates were 94.1% ($n = 11,748$) and 94.9% ($n = 11,457$), respectively. Nonparticipants included parent refusals (<1%), student refusals (<1%), and student absentees (<5%). Make-up surveys were offered in all schools to minimize the latter. Response rates did not vary by study condition, city, school type, or grade. To ensure reasonable reliability and validity, students who answered four or more questions inconsistently on a survey (e.g., reported current tobacco use but no lifetime use) were eliminated (<1%).

This study focuses on the cohort of students who participated in the 2004 and 2005 surveys ($n = 8,369$). The attrition rate for the cohort was higher among both schools and students in the control condition compared with the intervention (31.5% versus 24.0%; $P < 0.01$) and for students who reported tobacco use at baseline compared with those who did not (44% versus 27%; $P < 0.01$), but there was no differential attrition between study conditions by tobacco use. In the cohort ($n = 8,369$), the mean age was 11.0 (in 6th), 12.1 (in 7th), 12.8 (in 8th), and 13.9 (in 9th) years; 43.5% lived in Delhi (versus Chennai); 56.4% were government school (versus private school); 52.0% were in the younger grades (6th/7th; versus older, 8th/9th); 51.6% were male (versus female); and 47.9% were in the intervention (versus control) condition.

Intervention. MYTRI is a 2-year, school-based, multiple component tobacco intervention. A more detailed description of the intervention program is provided elsewhere, including a comprehensive account of how the MYTRI intervention model (Fig. 1), derived from successful models used in the United States, was "translated" for use in India (6). The program is based on Social Cognitive Theory and other theories of youth health promotion (6, 9). At its core, it is a comprehensive social influences program, with a focus on normative education and skill building, with knowledge components, too (12). MYTRI addresses multiple forms of tobacco use relevant in this setting (chewing tobacco, cigarette, and bidi).

In year 1, intervention strategies included the following: (a) 7 classroom activities (curriculum); (b) 6 school posters; (c) 6 parent postcards; and (d) peer-led health activism. Classroom activities were conducted in small groups of 10 to 15 and were led by students or peer leaders (students admired by their classmates, elected as so). This approach has been successful in the United States (13) but is novel to India, where didactic instruction by teachers alone is the norm. These activities were designed to be interactive and enjoyable (e.g., games). All of the posters and postcards were designed to complement the classroom activities. Posters were hung in classrooms and around the school during an activity, and postcards were hand delivered to parents by the students after an activity. As an extension of the classroom activities, competitions were also held within and between schools (i.e., intraschool and interschool activities) and included model building (crafting a three-dimensional model a tobacco-free school) and street play (an extended, culturally appropriate role play to practice refusal skills) competition for the 6th and 8th graders, respectively.

The intervention was the same for both grades, except for these competitions and their related classroom activity. All strategies targeted psychosocial risk factors related to tobacco use among these youth (Fig. 1; refs. 8-10). School posters and

Intermediate Outcomes from Project MYTRI

postcards for parents, for example, were designed to increase knowledge about the negative health effects of tobacco. Interactive classroom activities were designed to help students learn how to resist offers of tobacco from friends and family and practice being an effective advocate against tobacco use in their homes, schools, and communities. The different components of the intervention were designed in a synergistic way, to complement and supplement each other, to maximize the program's ability to change key risk factors (6).

Implementation of the intervention began with trainings for staff, teachers, and peer leaders at the start of the school year. Teachers and peer leaders received continued support throughout the school year from the staff. The intervention lasted for 4 months, with more than 15 h of activity. A set of manuals for teachers and peer leaders was supplied, as were game boards, game cards, and handbooks for the students. Materials were supplied in multiple languages (English, Hindi, and Tamil), given each school's needs.

Evaluation

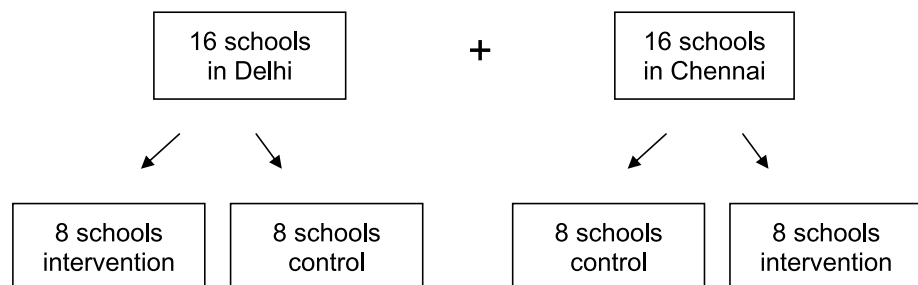
Data Collection. A self-administered pencil and article survey was implemented in classrooms in the schools by two-person teams of trained research staff using standardized protocols, before the 1st year of intervention started (2004) and after it ended (2005). Passive (but informed) parental consent and active student assent were required by the ethics boards in India and the United States and obtained by staff before survey administration. The confidentiality of student responses was assured. A unique ID not recognizable to the

students or any school staff was used to track students over time in subsequent survey administrations. Surveys were given in English, Hindi, and Tamil, based on the medium of instruction in schools. The survey is adapted from other instruments, like the Global Youth Tobacco Survey (2), and underwent rigorous piloting before its administration (3).

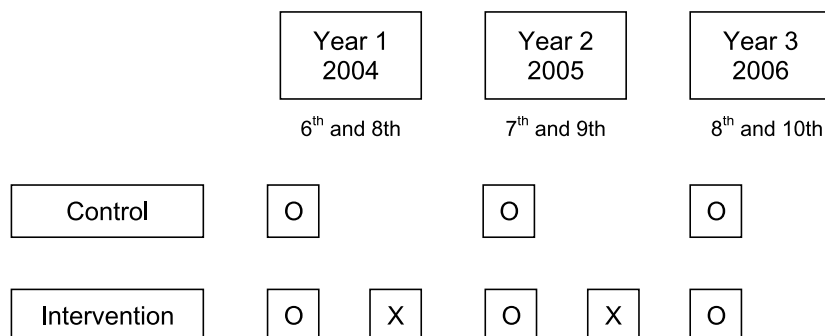
Measures

Psychosocial Risk Factors. Multi-item, summative scales were created to measure 14 psychosocial risk factors that are related to tobacco use among youth in India and were targets of the tobacco prevention program (8, 10). These variables are listed in Table 1. The Cronbach's α for these scales ranged from 0.69 to 0.99. A higher score on all scales indicates less risk, so these were hypothesized to be significantly higher in the intervention condition compared with the control after 1 year of intervention. These psychosocial risk factors informed the design of the intervention model, as they became the objectives of the intervention (see Fig. 1). In designing the intervention components, or activities, we sought to change these factors to, in turn, reduce/prevent tobacco use. The risk factors included knowledge, attitudes, skills, and social norms.

Tobacco Use and Intentions. Ten dichotomous variables were used to measure tobacco use and intentions. Changes in these variables were not necessarily expected, or hypothesized to occur, after 1 year of this 2-year intervention program. A higher score on the variables represents greater intentions to use tobacco/more tobacco use.



Note. Each group of 8 schools includes: 4 Private Co-educational schools (boys and girls); 2 Government Co-educational schools (boys and girls); 1 Government Boys only school; and 1 Government Girls only school. Private schools generally serve those who are more affluent (mid-high SES), while Government schools serve those who are less affluent (low-mid SES). Schools were randomized to study condition within a city.



Note. Figure adapted from Shadish, Cook, & Campbell (2002). "O" represents a survey and "X" represents the intervention. Two cohorts of students, who were in the 6th and 8th grade when the study began, in 2004, were followed over time in 32 schools, 16 of which were in Delhi and 16 of which were in Chennai. Schools were randomly assigned to receive the intervention or serve as a delayed program control within a city.

Figure 2. Study design for Project MYTRI.

Table 1. Description of multi-item scales used to measure psychosocial factors, Project MYTRI, 2004-2005

	Items*	Range [†]	Example of an item on the scale
Knowledge of health effects	5	0-10	"Are all kinds of tobacco use dangerous?"
Beliefs about social consequences	5	0-15	"If you used tobacco, would your parents get angry?"
Reasons to use tobacco	6	0-18	"Does using tobacco make a person appear to be more grown up?"
Reasons not to use tobacco	5	0-15	"I do not want to use tobacco because my friends do not use it."
Refusal skill self-efficacy	5	0-15	"Could you say 'no' if a close friend gave you tobacco?"
Social susceptibility to chewing	4	0-12	"If someone at a party gave you tobacco, would you chew it?"
Social susceptibility to smoking	4	0-12	"If someone at a party gave you tobacco, would you smoke it?"
Perceived prevalence of chewing	4	0-12	"How many boys your age in India do you think chew tobacco?"
Perceived prevalence of smoking	4	0-12	"How many boys your age in India do you think smoke tobacco?"
Normative beliefs	6	0-18	"Is it okay for people your age to try tobacco out of curiosity?"
Normative expectations	6	0-18	"If you were to use tobacco, would your close friends like it?"
Advocacy skill self-efficacy	8	0-24	"Do you think you could help a friend stop using tobacco?"
Knowledge of tobacco control policy	3	0-6	"Does your state have a law that bans tobacco use to minors?"
Support for tobacco control policy	5	0-15	"Should smoking be permitted in public places?"

*The number of items (or questions on the survey) included on the scale.

[†]The range of possible scores for the scale, once the items (or questions on the survey) were added up. A higher score on all scales indicates less risk, or conversely is more protective.

Intentions to Use Tobacco. Six questions on the survey measure intentions to chew or smoke tobacco in the future: "Do you think that you will try chewing tobacco in the next year?"; "Do you think that you will try chewing tobacco when you enter college?"; "Do you think that you will chew tobacco when you are an adult?"; "Do you think that you will try smoking cigarettes or bidis in the next year?"; "Do you think that you will try smoking cigarettes or bidis when you enter college?"; and "Do you think that you will try smoking cigarettes or bidis when you are an adult?" Response options were arranged on a four-point Likert scale ("surely yes," "maybe yes," "maybe no," and "surely no"), which was dichotomized for analyses as a "0" (surely/maybe no) and "1" (surely/maybe yes).

Tobacco Use. Three questions on the survey measure current tobacco use: "During the last 30 days, did you chew tobacco in any form?"; "During the last 30 days, did you smoke 1 or more bidis?"; and "During the last 30 days, did you smoke 1 or more cigarettes?" The response categories were "no" or "yes." Students who responded "yes" to one or more of these three questions were combined to measure current use of "any tobacco."

Data Analysis. Mixed-effects regression models were used to examine differences in the primary and secondary outcomes between the study conditions over time. These regression models are appropriate for studies like these given their unique design, as they account for the variability in the dependent variable between students and schools (11). In doing so, it protects the nominal type I error rate (11). The regression models use individual level data while appropriately accounting for the design effect inherent in the trial, namely that schools, not students, were randomized to study condition (11). The regression models were used to test for differences between the intervention and the control conditions, at the baseline survey. Then, they were used to test for differences between the intervention and control conditions, in the change from the baseline to the intermediate survey (i.e., analyses were done on "change scores" for each condition over time). All analyses were conducted with SAS 9.12 and its PROC MIXED (2006).

Results

Implementation. Program activities were implemented in intervention schools with good fidelity and high participation

rates. In year one, 13 of 16 schools completed all seven classroom activities (1 school completed 4, whereas 2 schools completed 2), for both grade levels. School posters and parent postcards, designed to complement these activities, were distributed to all intervention schools and students, respectively. Posters were hung in classrooms routinely during the activities, whereas 74% of postcards were delivered home by students to their parents. In the first year, 781 6th and 8th graders were trained as peer leaders and 161 of their teachers were trained to supervise and assist them. At the end of the classroom activities, the large interschool event in each city drew more than 3,500 people, representing 67% of the cohort of 6th and 8th graders. Observations were conducted at least once in each classroom to determine the fidelity with which classroom activities were implemented and 73% of them were delivered as prescribed.

Psychosocial Risk Factors. Table 2 presents results for psychosocial risk factors that were the targets of our multiple intervention strategies (Fig. 1). At baseline, there was only one marginally significant difference between the two study conditions in these variables; students in the intervention condition had more reasons to use tobacco than the controls ($P = 0.06$). After 1 year of program implementation, students in the intervention condition made significant gains in 12 of the 14 psychosocial risk factors targeted by the program. Compared with students in the control, students in the intervention condition (a) had better knowledge about the health effects of tobacco ($P < 0.01$); (b) believed that there were more negative social consequences to using tobacco ($P = 0.04$); (c) had fewer reasons to use tobacco ($P < 0.01$); (d) had more reasons not to use tobacco ($P = 0.03$); (e) were less socially susceptible to chewing ($P = 0.04$) and smoking ($P = 0.03$) tobacco; (f) perceived fewer peers and adults around them smoked ($P < 0.01$) or chewed ($P < 0.01$) tobacco; (g) felt that tobacco use was not acceptable, especially among their peers ($P < 0.01$); (h) were more confident in their ability to advocate for tobacco control ($P = 0.03$); (i) were more knowledgeable about tobacco control policies ($P < 0.01$); and (j) supported these policies, too ($P = 0.04$; Table 2). No significant differences between study conditions in changes in refusal skill self-efficacy ($P = 0.66$) or normative expectations were observed ($P = 0.25$).

Tobacco Use and Intentions. Table 3 presents the results for tobacco use and intentions. At baseline, there were no differences between study conditions in tobacco use or intentions to use tobacco in the future. After only 1 year of

Intermediate Outcomes from Project MYTRI

implementation, students in the intervention condition had fewer intentions to smoke tobacco in the next year ($P = 0.02$) and chew tobacco as they reached college age ($P < 0.01$). Marginally significant differences were noted in their intentions to smoke in college ($P = 0.08$) or as an adult ($P = 0.08$), as well as the intentions to chew tobacco as an adult ($P = 0.07$). No significant differences in actual tobacco use were observed. The prevalence of tobacco use decreased in both conditions over time.

Discussion

This article focuses on the intermediate outcomes of Project MYTRI, after students had been exposed to the 1st year of this 2-year school-based multiple component intervention designed to reduce and prevent tobacco use. Due to constraints placed on us by schools (e.g., exams and holiday), the

intermediate survey could not be administered until 4 to 5 months after implementation of the 1st year of the intervention had finished. The evaluation, therefore, represents "short-term" (not immediate) effects of the 1st year of intervention activities. Large-scale, controlled, randomized intervention trials in developing countries are rare, especially those with a "translational research" focus. The need for such trials to test tobacco interventions for adolescents in India is critical.

Importantly, this evaluation suggests that MYTRI is changing critical psychosocial risk factors that are being targeted by this intervention, which in turn should reduce and prevent tobacco use. This is notable at this stage of the intervention, with 1 year still to go, and includes changes in knowledge, attitudes, skills, and social norms. MYTRI seems to be affecting almost all of the risk factors it is intervening on (compare Fig. 1 with Table 2). Especially important, after 1 year of intervention, students feel tobacco use is less socially acceptable, especially among their

Table 2. Differences in psychosocial factors, by study condition, Project MYTRI, 2004-2005 (n = 8,369)

	Control (n = 4,360)	Intervention (n = 4,009)	P*
	Mean (SE) †	Mean (SE) †	
Knowledge of health effects ‡			
Baseline survey, 2004	7.79 (0.08)	7.61 (0.08)	0.13
Intermediate survey, 2005	7.94 (0.05)	8.37 (0.05)	<0.01
Beliefs about social consequences ‡			
Baseline survey, 2004	11.67 (0.46)	11.56 (0.45)	0.87
Intermediate survey, 2005	12.24 (0.25)	12.79 (0.24)	0.04
Reasons to use tobacco ‡			
Baseline survey, 2004	15.70 (0.10)	15.44 (0.09)	0.06
Intermediate survey, 2005	15.92 (0.14)	16.23 (0.14)	<0.01
Reasons not to use tobacco ‡			
Baseline survey, 2004	8.76 (0.86)	8.38 (0.83)	0.75
Intermediate survey, 2005	9.25 (0.57)	9.71 (0.55)	0.03
Refusal skill self-efficacy ‡			
Baseline survey, 2004	6.03 (0.92)	5.73 (0.89)	0.81
Intermediate survey, 2005	7.45 (0.77)	7.26 (0.74)	0.66
Social susceptibility to chewing ‡			
Baseline survey, 2004	11.24 (0.09)	11.07 (0.09)	0.19
Intermediate survey, 2005	11.50 (0.05)	11.59 (0.05)	0.04
Social susceptibility to smoking ‡			
Baseline survey, 2004	11.61 (0.07)	11.49 (0.06)	0.20
Intermediate survey, 2005	11.60 (0.05)	11.66 (0.05)	0.03
Perceived prevalence of chewing ‡			
Baseline survey, 2004	6.99 (0.13)	7.05 (0.12)	0.74
Intermediate survey, 2005	6.98 (0.13)	6.32 (0.13)	<0.01
Perceived prevalence of smoking ‡			
Baseline survey, 2004	7.21 (0.16)	7.34 (0.15)	0.57
Intermediate survey, 2005	6.85 (0.13)	6.42 (0.13)	<0.01
Normative beliefs ‡			
Baseline survey, 2004	16.63 (0.09)	16.46 (0.09)	0.18
Intermediate survey, 2005	16.85 (0.10)	17.18 (0.10)	<0.01
Normative expectations ‡			
Baseline survey, 2004	15.95 (0.23)	15.78 (0.23)	0.61
Intermediate survey, 2005	16.51 (0.12)	16.71 (0.12)	0.25
Advocacy skill self-efficacy ‡			
Baseline survey, 2004	17.67 (0.51)	17.22 (0.49)	0.53
Intermediate survey, 2005	17.70 (0.43)	18.57 (0.41)	0.03
Knowledge of tobacco control policy ‡			
Baseline survey, 2004	3.36 (0.08)	3.22 (0.08)	0.21
Intermediate survey, 2005	3.48 (0.08)	3.80 (0.08)	<0.01
Support for tobacco control policy ‡			
Baseline survey, 2004	13.83 (0.10)	13.72 (0.09)	0.46
Intermediate survey, 2005	13.98 (0.10)	14.17 (0.10)	0.04

NOTE: Sample of analysis is the cohort of students present for 2004 and 2005 surveys.

*P value at the baseline survey represents the statistical test (F[1,29]) of differences between conditions at baseline [i.e., (intervention_{baseline} - control_{baseline})]. P value at intermediate survey represents the statistical test (F[1,29]) of differences between conditions in the change score(s) over time [i.e., (intervention_{baseline} - intervention_{intermediate}) - (control_{baseline} - control_{intermediate})].

† Variable estimates are generated from mixed-effects regression models.

‡ A higher score on all scales indicates less risk, or conversely is more protective.

Table 3. Differences in intentions to use tobacco and tobacco use, by study condition, Project MYTRI, 2004-2005 (n = 8,369)

	Control (n = 4360)	Intervention (n = 4009)	P*
	Percentage (95% CI) [†]	Percentage (95% CI) [†]	
Intentions to chew tobacco			
Intentions to use next year			
Baseline survey, 2004	5.3 (1.6-6.9)	6.0 (4.6-7.4)	0.51
Intermediate survey, 2005	3.4 (2.8-4.0)	2.6 (2.0-3.2)	0.24
Intentions to use in college			
Baseline survey, 2004	6.1 (4.6-7.7)	7.4 (5.8-9.0)	0.24
Intermediate survey, 2005	4.8 (3.8-5.8)	4.1 (3.1-5.1)	<0.01
Intentions to use as an adult			
Baseline survey, 2004	7.3 (5.5-9.1)	8.0 (6.4-9.6)	0.60
Intermediate survey, 2005	5.4 (4.4-6.4)	4.5 (3.5-5.5)	0.07
Intentions to smoke tobacco			
Intentions to smoke next year			
Baseline survey, 2004	1.6 (1.0-2.2)	2.4 (1.8-3.0)	0.12
Intermediate survey, 2005	2.6 (1.8-3.4)	1.6 (0.8-2.4)	0.02
Intentions to smoke in college			
Baseline survey, 2004	2.7 (1.9-3.5)	3.4 (2.6-4.2)	0.24
Intermediate survey, 2005	4.3 (2.9-5.7)	3.2 (1.8-4.6)	0.08
Intentions to smoke as an adult			
Baseline survey, 2004	4.5 (3.3-5.7)	4.7 (3.5-5.9)	0.87
Intermediate survey, 2005	5.4 (3.8-7.0)	3.8 (2.2-5.4)	0.08
Current use of tobacco			
Chewing tobacco			
Baseline survey, 2004	2.5 (1.7-3.3)	2.5 (1.7-3.3)	0.97
Intermediate survey, 2005	0.9 (0.5-1.3)	1.1 (0.7-1.5)	0.68
Smoking bidis			
Baseline survey, 2004	0.9 (0.3-1.5)	1.3 (0.7-1.9)	0.27
Intermediate survey, 2005	0.7 (0.3-1.1)	0.8 (0.4-1.2)	0.51
Smoking cigarettes			
Baseline survey, 2004	0.9 (0.3-1.5)	1.0 (0.4-1.6)	0.76
Intermediate survey, 2005	1.2 (0.8-1.6)	0.7 (0.3-1.1)	0.27
Any tobacco use			
Baseline survey, 2004	3.6 (2.4-4.8)	3.9 (2.7-5.1)	0.72
Intermediate survey, 2005	2.2 (1.6-2.8)	2.2 (1.6-2.8)	0.76

NOTE: Sample of analysis is the cohort of students present for 2004 and 2005 surveys.

Abbreviation: 95% CI, 95% confidence interval.

*P value at the baseline survey represents the statistical test (F[1,29]) of differences between conditions at baseline [i.e., (intervention_{baseline} - control_{baseline})]. P value at intermediate survey represents the statistical test (F[1,29]) of differences between conditions in the change score(s) over time [i.e., (intervention_{baseline} - intervention_{intermediate}) - (control_{baseline} - control_{intermediate})].

[†] Variable estimates are generated from mixed-effects regression models.

peers. Changes in norms like these have been critical and consistent mediators of effective school-based prevention programs in the United States (14), so are important to show at this stage of the program. Some changes in intentions to use tobacco were also noted, although changes in actual tobacco use were not observed at this stage of the implementation of the intervention. Intentions to smoke or chew tobacco are potent predictors of the onset of tobacco use, so changes in these variables are important to note at this stage of implementation (13). The prevalence of current (past 30-day) tobacco use was low (<5%), making differences between conditions difficult to detect. Other measures, intended to be more sensitive to change in tobacco use (e.g., past year use), have been added to the last survey (2006).

The strengths of this study include its rigorous design and appropriate analysis. The schools were randomized to condition, after being matched by school type. A nested cohort within repeated cross-sections of students were followed over time to assess the effect of the intervention using a baseline and intermediate survey. Data were analyzed using appropriate statistical techniques (11). Students self-reported tobacco use, with no biochemical validation. Potential misreports of tobacco use could not be assessed, so is a clear limitation. Self-reports seem to be reliable and valid in this setting, based on significant associations with known psychosocial risk factors for tobacco use (10). The surveys were administered confiden-

tially, as well (9). It was not financially feasible to do biochemical testing, which is complicated by the many forms in which tobacco is used here in India (e.g., gutkha, bidi, and cigarettes). Although the attrition rates noted here did not differ between study conditions (thus the estimate of the effect of the intervention is robust), significantly more tobacco users dropped out of the study than non-tobacco users. This could affect the generalizability of the results that are reported in this article.

Although the effect of school-based tobacco prevention programs for youth in the United States has varied (7), evidence from a recent quasi-experimental study in China (15) and a prior randomized trial conducted by our team in India (16) suggests that this approach, in the short-term at least, may be effective for youth in large, developing nations, where the tobacco epidemic is mounting. Active youth engagement and empowerment (what we term "peer-led health activism" here) was a critical ingredient of our prior effective school-based program in India and continues in this trial to be an integral part of our intervention approach. This strategy has become particularly popular in the West (17). Future reports from our team will examine the efficacy of this component in more depth and provide results from our last survey, to show whether this intervention, in its entirety, is effective at reducing and preventing tobacco use among urban Indian youth.

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