

# Associations Between Tobacco Marketing and Use Among Urban Youth in India

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**Objectives:** To study if receptivity and exposure to tobacco marketing are correlated with tobacco use and psychosocial risk factors for tobacco use among a sample of urban Indian youth. **Methods:** Analysis of cross-sectional survey data from Project MYTRI, a group randomized intervention trial, in Delhi and Chennai, India, collected from sixth and eighth graders (n=11,642), in 32 schools in 2004. **Results:** Exposure to tobacco advertisements and receptivity to

tobacco marketing were significantly related to increased tobacco use among students. **Conclusion:** This association suggests the need to strengthen policy and program-based interventions in India to reduce the influence of such exposures.

**Key words:** tobacco use, youth, schools, receptivity to tobacco marketing, exposure to tobacco advertising

*Am J Health Behav.* 2008;32(3):283-294

Tobacco advertising, through various media, creates positive product imagery or associations in the minds of young people.<sup>1</sup> Tobacco industry marketing includes varied activities designed to increase the sale of tobacco products. The question as to whether exposure to

tobacco advertising influences tobacco use among youth has been the subject of debate between public health professionals and the tobacco industry. A number of cross-sectional<sup>2,3</sup> and longitudinal studies<sup>4,5</sup> in the West have established an association or shown a direct causal relationship, respectively, between exposure to tobacco advertisements and promotions and adolescents' decision to begin or continue smoking. Studies that evaluated the association between receptivity to cigarette promotions and smoking uptake in adolescents revealed that the likelihood of smoking uptake is increased when an adolescent acquires a cigarette promotional item or becomes willing to use one.<sup>6</sup> There is evidence that young people smoke the most highly advertised brands, indicating the responsiveness of youth to tobacco industry's marketing campaign.<sup>7,8</sup>

In contemporary India, which is experiencing rapid epidemiological transition, several factors, particularly tobacco use, are contributing to a progressive rise in the burden of noncommunicable diseases.<sup>9</sup>

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Deaths attributable to tobacco are expected to rise alarmingly in many developing nations of the world over the next 2 decades, with India having the fastest rate of rise in these deaths.<sup>10</sup> Most of these deaths will occur in the productive years of adult life, as a consequence of an addiction acquired in youth. Tobacco use in India is a much greater public health challenge compared with other countries due to the many varieties in which tobacco is consumed. This includes smoking (like bidis and cigarettes), smokeless forms (such as gutkha and mawa for chewing), and direct application of tobacco (eg, Mishri).<sup>10</sup> Cigarette smoking constitutes only 14% of total tobacco usage in India, and a large part of overall tobacco use is indigenous tobacco products that include both smoked and smokeless forms.<sup>11</sup> Because most young people in developing countries are currently nontobacco users, the tobacco industry views youth as an attractive target group.

The Global Youth Tobacco Survey, conducted in Delhi and Tamil Nadu in 2001, revealed that exposure to pro-tobacco advertisements was very high (86.8% in Delhi and 80.5% in Tamil Nadu) among 13- to 15-year-old students.<sup>12,13</sup> The types of exposures that have been found to influence perceptions related to tobacco use among adolescents in India include sponsorship of sports events like cricket,<sup>14</sup> media images and satellite television,<sup>15</sup> and the portrayal of tobacco use in Indian films.<sup>16</sup> However there is no study in India that provides clear evidence that increased exposure to tobacco advertising and promotional activities is associated with increased tobacco use by youth.

In September 2000, the Indian Central government banned tobacco advertising on cable television.<sup>10</sup> Since then, the Indian government has made even more rapid strides towards implementing measures to regulate tobacco use with The Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply and Distribution) Act, 2003. This Act, as enforced by the government of India as of May 1, 2004, calls for a complete ban on direct as well as indirect forms of tobacco advertising and promotions. India is also a signatory to the WHO's Framework Convention on Tobacco Control (FCTC) and has also ratified it (<http://www.fctc.org>).

The enactment of an advertising ban on all tobacco products in 2004, however, has not deterred the tobacco industry from advertising and promoting their products by alternate means. Indian tobacco industries are creatively working through the loopholes in the current legislation related to the advertising ban.<sup>10</sup> It is important to study the influence of this changing tobacco advertising environment on youth in India, where the government is making efforts to protect the youth from exposure to tobacco advertising and tobacco companies are trying hard to keep their brands and products alive in people's memory.

This paper presents the results of a recent study of the association of receptivity to tobacco marketing and exposure to tobacco advertisements with tobacco use among urban youth in 2 cities of India. A survey of youth in Delhi and Chennai, India, was conducted in 2004 as part of the baseline assessment for Project MYTRI (Mobilizing Youth for Tobacco Related Initiatives in India), which is a group randomized trial designed to evaluate the efficacy of a school-based, multi-component intervention to prevent and reduce tobacco use among urban youth in grades 6-9 in India. MYTRI is a research study conducted through a partnership between the University of Texas (USA) and 2 nongovernment organizations in India: HRIDAY (Health Related Information Dissemination Amongst Youth in Delhi) and TNVHA (Tamil Nadu Voluntary Health Association in Chennai).

Initial analyses of the baseline data revealed that the prevalence of tobacco use was significantly higher among students in the sixth grade versus eighth grade.<sup>17,18</sup> This unusual finding suggested a new trend of higher tobacco use by young persons in this rapidly changing environment of India. Students attending government schools (of middle-lower SES), boys, older students, and those in sixth grade were using more tobacco in this survey as compared with students who were in private schools (of middle to high SES), girls, younger, and in eighth grade. In this sample, tobacco use increased with age, but only within a grade. Within each grade level (sixth v eighth grade), the older students were using tobacco at significantly higher rates than the younger students. In addition, sixth-grade students' tobacco use was 2 to 4

times that of eighth-grade students.<sup>17</sup> In this study, 24.8% of sixth graders and 9.3% of eighth-grade students had ever used tobacco; 6.7% and 2.9% respectively were current users. Reasons for this differential were explored in a follow-up study that analyzed a series of etiological factors to determine (1) how they were related to tobacco use and (2) how they were distributed across the 2 grade levels. Some of the strongest correlates identified by this study included social susceptibility to and social norms about tobacco use. Almost all psychosocial factors were unevenly distributed between grade levels, with sixth graders showing more risk than eighth graders, indicating higher overall risk for tobacco use. Interestingly, exposure to advertising was an especially strong correlate of tobacco use for sixth graders but not for eighth graders.<sup>18</sup> Intrigued by this, we were interested in exploring further relationships concerning advertising and promotions in this study sample.

The present study addresses 4 specific questions: (1) Is receptivity to tobacco advertising or promotion related to tobacco use among youth in 2 urban cities in India? (2) Is receptivity to tobacco advertising or promotion associated with psychosocial risk factors for tobacco use among youth in 2 urban cities in India? (3) Is exposure to tobacco advertising related to tobacco use among youth in 2 urban cities in India? (4) Is exposure to tobacco advertising associated with psychosocial risk factors for tobacco use among youth in 2 urban cities in India? A series of dose-response analyses were conducted to examine these potential associations. Grade level and gender were also included as potential effect modifiers of the relationship between receptivity and exposure to tobacco advertising and tobacco use.

## METHODS

### Subjects

The research design of Project MYTRI is reported in detail elsewhere.<sup>17-19</sup> Project MYTRI includes 32 schools from 2 cities: Delhi (16 schools) and Chennai (16 schools). These schools were selected as they represent the range of types of schools in these cities of India. The schools included are government (representing low - middle SES), private (representing middle - high SES), girls only, boys only, and

**Table 1**  
**Demographics of Sample at**  
**Baseline (n=11,642)<sup>a</sup>**

	Frequency	Percent
<b>City/Centre</b>		
Delhi	n = 5889	50.6%
Chennai	n = 5753	49.4%
<b>School Type</b>		
Private	n = 4489	38.6%
Government	n = 7153	61.4%
<b>Class/Grade</b>		
Class 6	n = 6165	52.9%
Class 8	n = 5477	47.1%
<b>Gender</b>		
Male	n = 6386	54.9%
Female	n = 5256	45.2%
<b>Age (completed)<sup>b</sup></b>		
<=10 years	n = 1598	13.8%
11 years	n = 3035	26.2%
12 years	n = 2792	24.1%
13 years	n = 2580	22.3%
14 years	n = 1075	9.3%
15 years	n = 345	3.0%
>= 16 years	n = 161	1.4%

#### Note.

- a This is the sample for analysis, which includes all students who completed a survey at baseline (n=11,748) minus those who responded inconsistently to more than 3 questions on the survey (n=106).
- b Some students did not report their age (n=56).

coeducational schools. Total eligible students in sixth and eighth grade of 32 schools were 12,484. A self-administered, paper and pencil survey was conducted with 11,748 students, representing 94% of the sample, at baseline (before intervention began), during June-August 2004. After eliminating inconsistent responders (<1%) of sample, absentee students (4.4%), and those who did not consent (1.5%), the final sample of analysis for this study was 11,642 students. Of these 5889 (50.6%) students were from Delhi, 7153 (61.4%) belonged to government schools, 6386 (54.9%) were males, and 6165 (52.9%) were in grade 6 (Table 1). The mean age of the sixth and eighth graders was 11.2 and 12.9 years, respec-

**Table 2**  
**Description of Multi-item Scales Used to Measure Psychosocial Risk Factors**

Scales	Items	$\alpha$	Range	Examples of Items on Scales
Intentions to use tobacco (chewing)	4	0.85	0-12	Do you think you will chew tobacco when you are an adult?
Intentions to use tobacco (smoking)	4	0.87	0-12	Do you think you will try smoking cigarettes or bidis in the next year?
Social susceptibility (chewing)	4	0.87	0-12	If one of your close friends gave you chewing tobacco, would you chew it?
Social susceptibility (smoking)	4	0.88	0-12	If a group of friends gave you a cigarette or a bidi, would you smoke it?
Reasons to use tobacco	6	0.73	0-18	Does using tobacco make a person appear to be more grown up?
Perceived prevalence (chewing)	4	0.64	0-12	How many boys of your age in India do you think chew tobacco?
Perceived prevalence (smoking)	4	0.66	0-12	How many boys of your age in India do you think smoke tobacco?
Normative beliefs	6	0.79	0-18	Is it okay for boys of your age to try tobacco out of curiosity?

tively (range 10-16 years).

The survey was administered in each classroom by a trained team of 2 persons using standardized protocols. Surveys were administered in English, Hindi, and Tamil in accordance with the medium of instruction in schools. Active student assent and informed but passive parent consent were obtained prior to the survey. Students were assured about the confidentiality of their responses. Ethical approval was provided by the Independent Ethics Committee, Mumbai, India, and the Institutional Review Board, University of Minnesota, Minn.

#### Measures

**Current tobacco use.** Three questions were used to measure current use of tobacco: "During the last 30 days, did you chew tobacco in any form?/ Smoke one or more bidis?/ Smoke one or more cigarettes?" The response categories were Yes and No. Students who responded "yes" to one or more of the questions were given a "1" on this variable (for current use of

any tobacco) whereas all other students received a "0" (for no current use of any tobacco).

**Ever tobacco use.** Three questions were used to measure ever tobacco use: "How old were you when you first chewed tobacco?/ Put a lit bidi in your mouth?/ Put a lit cigarette in your mouth?" The first response category for this question was "I have never smoked/chewed tobacco" The students who chose this category were coded "0" on this variable, to represent no use. The other response option categories provided included ages at which the student could have first smoked/chewed tobacco: 7 years old or less, 8 to 9 years old, 10 to 11 years old, 12 to 13 years old, 12 to 13 years old, 14 to 15 years old and 16 years old or more. All these categories were collapsed and coded as "1," to represent ever use. Similar to the measure of current tobacco use, responses to the 3 questions were combined in this way so that ever use of any tobacco was coded as "0" (for no use) and "1" (for use).

**Psychosocial risk factors.** The psychosocial risk factors analyzed in this study include (1) intentions to chew tobacco in future, (2) intentions to smoke tobacco in the future, (3) social susceptibility to chewing tobacco, (4) social susceptibility to smoking tobacco, (5) reasons to use tobacco, (6) perceived prevalence of chewing tobacco, (7) perceived prevalence of smoking tobacco, and (8) normative beliefs about tobacco use. These factors were shown in a prior study to be associated with increased use of tobacco among youth in India.<sup>18</sup> Scales were created to measure these factors using multiple items on the MYTRI survey. A brief description of each scale, including examples of items on each scale, is provided in Table 2. Details about how these scales were constructed are provided elsewhere.<sup>18</sup> Because the range of each scale (Table 2) varied, all scales were standardized before being used in the analyses (ie, the mean was set to 0 and the standard deviation to 1). This allows for direct comparisons between scales in regard to magnitude of the parameter estimates that are generated by the analyses.<sup>19</sup>

**Receptivity to tobacco advertising or promotion.** An index of receptivity to tobacco advertising or promotion was created combining responses to 3 items on the survey: "Do you have a favorite tobacco advertisement?" "Do tobacco advertisements show real life situations?" "Would you ever wear or use an item that has the name of a tobacco product on it?". The response categories were "Yes" and "No." Based on the responses, 3 levels of receptivity were created, with students being highly receptive if they responded "Yes" to 2 or all 3 questions, being moderately receptive if they responded "Yes" to one of the 3 questions, and being not at all receptive if they responded "No" to all 3 questions.

**Exposure to tobacco advertising.** An exposure index measuring the range of venues where tobacco advertisements usually appear in India, despite there being an advertising ban both pre- and post implementation of Indian Tobacco Control Act 2003, was created by combining responses to options listed on the survey under the question "Have you seen any advertisement for tobacco?" The 7 options given were on television; in movies; in cinema halls; in newspapers,

magazines, or other print media; on hoardings (billboards); on posters or walls; at sports events and at cultural events. The response categories for each were Yes and No. Each question was scored as "0" for No and "1" for Yes. Using responses to these 7 options, 3 levels of exposure to tobacco advertisements were created with students being highly exposed if they reported having seen tobacco advertisements at >4 places, being moderately exposed if they reported having seen tobacco advertisements at 1-4 places, and not exposed if they reported not having seen tobacco advertisements on any of the listed 7 places.

### Data Analysis

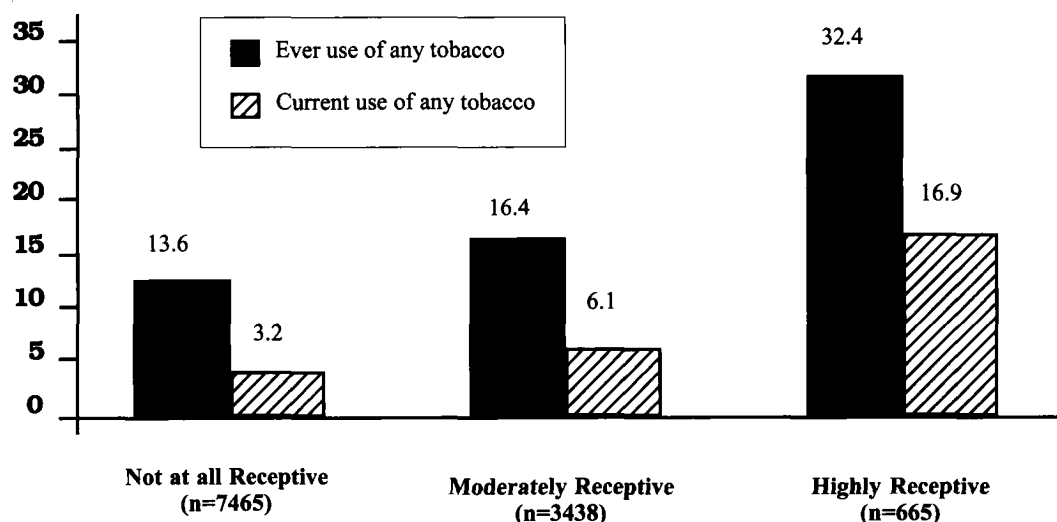
Mixed-effects regression models were used to examine the following: (1) the association between the level of receptivity to tobacco advertising or promotion and current or ever use of tobacco, (2) the association between the level of receptivity to tobacco advertising and psychosocial risk factors for tobacco use, (3) the association between exposure to tobacco advertisements and current or ever use of tobacco, and (4) the association between exposure to tobacco advertisements and psychosocial risk factors for tobacco use. Receptivity and exposure to tobacco advertising were the independent variables in these regression models; tobacco use and psychosocial risk factors were the dependent variables. Mixed-effects models (which are also known as hierarchical models in other contexts) are appropriate for study designs like these because they appropriately account for the variability between students and schools in the dependent variable.<sup>21</sup> Schools were treated as a nested random effect in the model.<sup>22</sup> Gender and grade were examined as potential effect modifiers in regression models 1 and 3 described above. All models were adjusted for city, type of school, age, grade, and gender (when not stratified by the latter variables). The analyses were conducted using SAS statistical software.

## RESULTS

### Receptivity to Tobacco Advertisements or Promotion

Of the 493 students who responded that they had a favorite tobacco advertisement, 238 recollected specific brand names. A total of 52 brands were listed,

**Figure 1**  
**Difference in Tobacco Use, by Receptivity to Tobacco Advertising**  
**Among Students in Project MYTRI (N=11,642)**



including smoking and chewing forms of tobacco products. Of the students reporting brand names, the average number of brands reported was about one per student. Although a few students (n=3) reported up to 5 brands, most reported just

one (n=186), and others reported about 2 to 4 brands (n=49). There were more favorite advertisements reported for chewing tobacco (n=236) than smoking tobacco (n=83). Among smoking forms, Wills, a cigarette brand name of Indian Tobacco

**Table 3**  
**Relationship Between Receptivity to Advertising and Tobacco Use**  
**by Grade<sup>a</sup>**

	Grade 6			P-value <sup>b</sup>	Grade 8			P-value <sup>b</sup>
	Not at all Receptive (n=3895) Percent	Moderately Receptive (n=1851) Percent	Highly Receptive (n=361) Percent		Not at all Receptive (n=3570) Percent	Moderately Receptive (n=1587) Percent	Highly Receptive (n=304) Percent	
Ever use of any tobacco	21.0(± 2.4)	24.9(± 2.6)	41.6(± 4.6)	< 0.01	8.2(± 1.6)	10.1(± 2.0)	24.7(± 3.6)	< 0.01
Current use of any tobacco	4.2(± 1.4)	8.3(± 1.6)	21.4(± 2.8)	< 0.01	2.0(± 0.8)	3.5(± 1.0)	11.6(± 2.0)	< 0.01

Note.

a Estimates generated from mixed-effects models adjusted for city, school type, gender, and age.

b P value for trend

**Table 4**  
**Differences in Psychosocial Risk Factors for Tobacco Use, by**  
**Receptivity to Tobacco Advertising, Among Students in Project**  
**MYTRI (n=11,642)<sup>a</sup>**

	Not at all Receptive (n=7465)		Moderately Receptive (n=3438)		Highly Receptive (n=665)		P-value
	Mean <sup>c</sup>	SE	Mean <sup>c</sup>	SE	Mean <sup>c</sup>	SE	
Intentions to use tobacco (chewing) <sup>b</sup>	- 0.042	(0.025)	0.090	(0.027)	0.633	(0.044)	< 0.01
Social susceptibility (chewing) <sup>b</sup>	- 0.023	(0.028)	0.107	(0.031)	0.651	(0.046)	< 0.01
Intentions to use tobacco (smoking) <sup>b</sup>	- 0.076	(0.020)	0.061	(0.023)	0.713	(0.041)	< 0.01
Social susceptibility (smoking) <sup>b</sup>	- 0.057	(0.022)	0.074	(0.026)	0.640	(0.043)	< 0.01
Reasons to use tobacco <sup>b</sup>	- 0.095	(0.019)	0.130	(0.022)	0.839	(0.041)	< 0.01
Normative beliefs <sup>b</sup>	- 0.065	(0.023)	0.137	(0.026)	0.735	(0.043)	< 0.01
Perceived prevalence(chewing) <sup>b</sup>	- 0.026	(0.026)	0.079	(0.029)	0.214	(0.045)	< 0.01
Perceived prevalence(smoking) <sup>b</sup>	- 0.052	(0.019)	0.074	(0.023)	0.230	(0.042)	< 0.01

**Note.**

- a** Estimates generated from mixed-effects models adjusted for city, school type, gender, age, and grade.  
**b** Scale scores are standardized. A higher score (eg, positive number) denotes more risk (or, conversely, is less protective).  
**c** Estimate represents the mean score for each scale (eg, intentions to use tobacco) in a particular category of receptivity to advertising (eg, not at all receptive). A larger estimate (eg, positive number) denotes more risk (eg, more intentions to use tobacco) (or, conversely, is less protective).

Company (ITC, the Indian subsidiary of British American Tobacco), was the most reported tobacco brand, followed by Gold Flakes of ITC, and Red and White of Godfrey Philips India Ltd (an Indian subsidiary of Philip Morris). Advertisements of chewing tobacco product brands that students reported to be their favorite included 35 brands, with Pan Parag being the most reported brand.

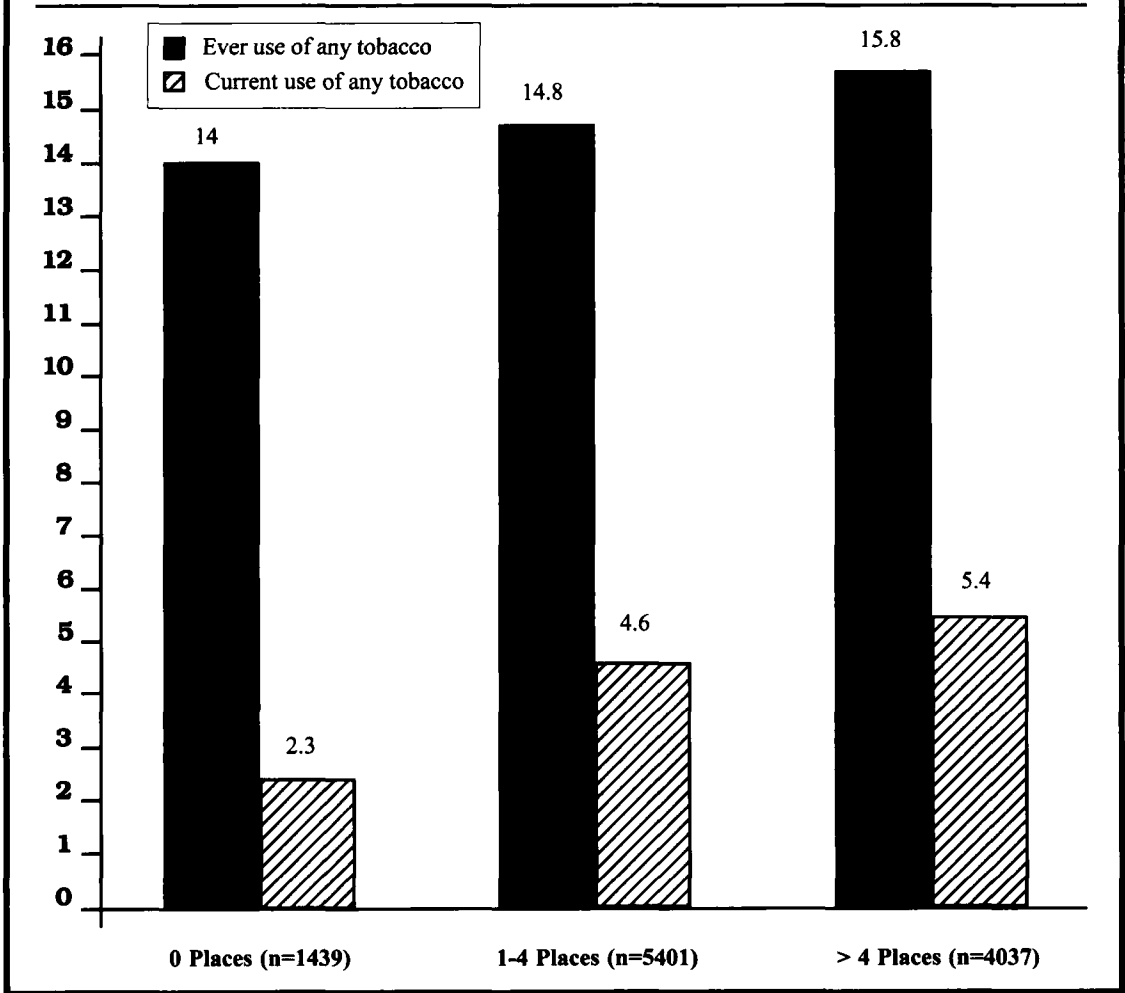
Of the 11,642 students, 99.3% (n=11,568) responded to the questions of receptivity. On the index of receptivity to tobacco advertising, 5.8% (n=665) were categorized as highly receptive, 29.7% (n=3438) were categorized as moderately receptive, and 64.5% (n=7465) were categorized as not at all receptive. Receptivity to tobacco advertising was significantly related to increased tobacco use among these students, with evidence of a dose-response relationship (Figure 1;  $P < 0.01$ ). The prevalence of tobacco use rose progressively with higher scores on the 3 measures of receptivity to tobacco advertising and promotion (having a favorite tobacco advertisement, believing misleading imagery created by tobacco advertisements, and being willing to use a tobacco promotional item).

This relationship did vary by grade, for both ever-tobacco use ( $P < 0.10$ ) and current tobacco use ( $P < 0.01$ ). The dose-response relationship was steeper for students in grade 8, as compared to grade 6, with ever use of tobacco among highly receptive students being more than twice as high as compared to students who were categorized as moderately receptive (Table 3). This relationship did not vary by gender, for either ever ( $P = 0.51$ ) or current ( $P = 0.95$ ) use.

Receptivity to tobacco use was also significantly related to all psychosocial risk factors evaluated in this study ( $P < 0.01$ ). Table 4 presents the differences in various psychosocial risk factors with rising levels of receptivity to tobacco advertising among these students. Students who were categorized to be not at all receptive scored lower on all of the factors, indicating that they were at less risk compared with students who were categorized to be moderately receptive who in turn had a lower risk than those who were categorized to be highly receptive.

There was variation in the strength of association of psychosocial risk factors with the level of receptivity as shown by the standardized scores in Table 4. Among

**Figure 2**  
**Difference in Tobacco Use, by Exposure to Advertising Venues**  
**Among Students in Project MYTRI (N=11,642)**



the students who were categorized to be highly receptive to tobacco advertising, the strongest influence was observed on students' reasons to use tobacco (eg, "Does using tobacco make a person appear to be more grown up?") followed by their normative beliefs about tobacco (eg, "Is it okay for film actors and actresses to promote tobacco products?")

**Exposure to Tobacco Advertising**

Of the 11,642 students, 10,877 (93.4%) responded to the questions related to exposure to tobacco advertising. About 37% students reported having seen tobacco

advertisements at more than 4 places, about 50% reported to have seen tobacco advertisements at 1-4 places, and 13.2% reported not having seen any tobacco advertisement on any of the 7 places listed in the survey. The index of exposure to tobacco advertising (as indicated by number of places where students reported to have seen tobacco advertisements) was significantly associated with current use of any tobacco product among this sample of students (Figure 2), with evidence of a dose-response relationship between the number of venues of exposure and the percentage of students who



**Table 5**  
**Relationship Between Exposure to Advertising and Tobacco Use by Grade<sup>a</sup>**

	Grade 6			P-value <sup>b</sup>	Grade 8			P-value <sup>b</sup>
	0 Places (n=959) Percent	1-4 Places (n=2702) Percent	>4 Places (n=1943) Percent		0 Places (n=480) Percent	1-4 Places (n=2699) Percent	>4 Places (n=2094) Percent	
Ever use of any tobacco	19.4(± 3.2)	23.0(± 2.6)	23.3(± 2.8)	< 0.05	11.6(± 3.0)	8.6(± 1.6)	10.2(± 1.8)	< 0.05
Current use of any tobacco	3.0(± 2.0)	6.3(± 1.6)	7.2(± 1.6)	< 0.01	2.2(± 1.8)	2.5(± 0.8)	3.3(± 1.0)	0.20

**Note.**

**a** Estimates generated from mixed-effects models adjusted for city, school type, gender, and age

**b** P value for trend

currently use any tobacco product ( $P < 0.01$ ). There were no significant differences with regard to ever use of tobacco.

The relationship between exposure to advertising and tobacco use did vary by grade for both ever-tobacco use ( $P < 0.06$ ) and current tobacco use ( $P < 0.05$ ). The dose-response relationship was present for sixth graders, but not for eighth graders (Table 5). The relationship between exposure to advertising and ever tobacco use also varied by gender ( $P < 0.05$ ). The prevalence of ever tobacco use increased with exposure levels among girls ( $P = 0.02$ ), but not among boys ( $P = 0.66$ ). The relationship did not vary by gender, however, for current tobacco use ( $P = 0.36$ ). The prevalence of current tobacco use increased with increased exposure to tobacco advertising for both boys and girls.

All of the psychosocial factors studied showed a significant positive association with the exposure index, except for intentions to chew tobacco (eg, "Do you think that you will try chewing tobacco when you enter college?") and social susceptibility to chewing tobacco (eg, "If one of your close friends gave you chewing tobacco would you chew it?") (Table 6). Students who reported greater exposure (having seen tobacco advertisements at 1-4 places or > 4 places) scored higher on all psychosocial risk factors, indicating that they were at greater risk for tobacco use as compared to students who reported having not seen any tobacco advertise-

ment at any of the 7 places mentioned in the survey.

Among various psychosocial risk factors, exposure to advertising had the strongest relationship with perceived prevalence of chewing tobacco (eg, "How many boys of your age in India do you think chew tobacco regularly?") and smoking tobacco (eg, "How many adult males in India do you think smoke tobacco regularly?").

### DISCUSSION

This study provides evidence that tobacco advertising and promotion are associated with tobacco use among this sample of urban youth from 2 cities in India. These data suggest that advertising and promotion may contribute to an environment that makes young people more susceptible to tobacco use, by negatively influencing the psychosocial risk factors strongly predictive of subsequent use.<sup>1,4</sup> Our findings replicate what has been shown in cross-sectional studies in Western countries.<sup>3,23</sup> Such epidemiologic studies have not been conducted in large developing countries, especially in the context of changes in the socio-demographic profile of the population and rapidly changing tobacco control environment.

The finding that few students (493 out of 11,642) reported having a favorite tobacco advertisement and only 238 of them could recall a specific brand name sug-

**Table 6**  
**Differences in Psychosocial Risk Factors for Tobacco Use, by**  
**Exposure to Tobacco Advertising, Among Sixth- and Eighth-grade**  
**Students in Project MYTRI (n=11,642)<sup>a</sup>**

	0 Places (n=1439)		1-4 Places (n=5401)		>4 Places (n=4037)		P-value
	Mean <sup>c</sup>	SE	Mean <sup>c</sup>	SE	Mean <sup>c</sup>	SE	
Intentions to use tobacco (chewing) <sup>b</sup>	- 0.015	(0.034)	0.033	(0.025)	0.035	(0.026)	0.23
Social susceptibility (chewing) <sup>b</sup>	0.016	(0.037)	0.060	(0.028)	0.039	(0.030)	0.29
Intentions to use tobacco (smoking) <sup>b</sup>	- 0.100	(0.032)	0.011	(0.023)	0.035	(0.024)	< 0.01
Social susceptibility (smoking) <sup>b</sup>	- 0.051	(0.033)	0.014	(0.025)	0.037	(0.026)	0.01
Reasons to use tobacco <sup>b</sup>	- 0.188	(0.031)	0.045	(0.021)	0.047	(0.022)	< 0.01
Normative beliefs <sup>b</sup>	- 0.080	(0.034)	0.040	(0.025)	0.063	(0.026)	< 0.01
Perceived prevalence(chewing) <sup>b</sup>	- 0.129	(0.036)	- 0.023	(0.027)	0.125	(0.028)	< 0.01
Perceived prevalence(smoking) <sup>b</sup>	- 0.176	(0.031)	- 0.039	(0.020)	0.120	(0.022)	< 0.01

**Note.**

- a Estimates generated from mixed-effects models adjusted for city, school type, gender, age, and grade
- b Scale scores are standardized. A higher score (eg, positive number) denotes more risk or, conversely, is less protective.
- c Estimate represents the mean score for each scale (eg, intentions to use tobacco), in a particular category of exposure to advertising (eg, not at all receptive). A larger estimate (eg, positive number) denotes more risk (eg, more intentions to use tobacco) (or, conversely, is less protective).

gests that currently a small percentage of young people are aware of tobacco advertisements. This situation, however, can change and may be rapidly changing if tobacco advertising in India is not comprehensively restricted and the restrictions subsequently enforced. This study demonstrates that levels of receptivity to tobacco advertising or promotion and exposure to tobacco advertising are correlated with the prevalence of tobacco use (particularly current tobacco use). Current use of tobacco products was 5 times lower among students who were not at all receptive to tobacco advertising or promotion as compared to students who were categorized as highly receptive, with the moderately receptive group having an intermediate risk. This finding is also in line with a cross-sectional study in the West, where a dose-response relationship has been observed between the number of cigarette promotional items owned by an adolescent and the individual's likelihood of being a smoker.<sup>24</sup> Similar results were observed in this study with exposure to tobacco advertising and current tobacco use. This is consistent with a previous study in the West, which reported that youth seeing cigarette advertise-

ments in magazines increased their likelihood of experimenting with smoking.<sup>25</sup>

The data from this study about association between receptivity and exposure to tobacco advertisement and tobacco use add to the evidence that tobacco advertising may target and impact young adolescents.<sup>1,8</sup> This finding has serious implications for India, which has a 51% population below the age of 25 years. Studies have shown that smoking initiation largely occurs before the age of 18 and because the results of this study highlight that younger adolescents are more vulnerable, protecting the youth from the influence of tobacco advertising and promotion becomes an urgent public health concern in India. Due to the cross-sectional nature of this study, it is important to note that the association observed here could be bidirectional with no clear evidence of exposure (ie, receptivity to tobacco advertising and exposure index) preceding the response (ie, increased tobacco use). The fact that this study demonstrates that students have reported exposure to tobacco advertising at places where it has been banned since September 2000 (on television) and at other places, where it has been banned (like print

media etc.) after a complete ban on advertising was enacted in 2004, suggests that a comprehensive ban on advertising (and subsequent enforcement of that ban) may be required to protect youth from this exposure. The current law allows point of sale advertising; therefore students could have reported seeing advertisements on hoardings [billboards]. Thus, the results of our study provide additional support for the policy recommendation for enforcement of a comprehensive ban on tobacco advertising in order to effectively lower tobacco prevalence rates. However, one limitation of this study is the items forming the exposure index do not assess their exposure to tobacco advertising within a time frame; therefore, it is difficult to assess if the students are reporting exposure before the ban on tobacco advertising was enacted in India in 2004 or are reporting a new exposure.

Pursuant to implementation of a ban on direct and indirect tobacco advertising in India, since May 1, 2004, some tobacco brands continue to be advertised through surrogate means (eg, "brand stretching"). This was evident in the favorite tobacco advertisements reported by students (Pan Parag and Wills), which are the most advertised oral and smoked tobacco brands, respectively, even after enactment of the ad ban. These brands are extensively projected on television and print media by employing brand stretching onto nontobacco products (eg, advertising for clothing with the Wills brand name and having chewing pan masala product with the Pan Parag brand name). Attractive schemes of scratch coupons, accompanying gifts, and product placement in films are a few strategies being employed by the Indian tobacco companies to circumvent the legislation of advertising ban in India.<sup>10</sup>

The results of this study support the hypothesis that tobacco product advertising and promotions may be an important influence contributing to the increase in tobacco use and change in tobacco use patterns among urban Indian adolescents.<sup>17</sup> Such influences may have been strengthened by sophisticated Western images used by cigarette companies to target women and youth in India.<sup>26</sup> Because of the cross-sectional nature of this study, causal conclusions cannot be made without further longitudinal investigation. We cannot rule out the possibil-

ity of a reverse association in this study's findings, suggesting that tobacco use behavior may influence youth's receptivity to tobacco advertising or promotions.

The associations established in this study provide evidentiary support for regulatory controls on all direct and indirect methods by which tobacco products are advertised and promoted to youth, in order to protect young people from the tobacco industry's tactics of targeting the youth in developing countries through increased product exposure. Current legislation in India needs to be effectively enforced, and loopholes in the legislation need to be tightened to avoid advertising and promotion of tobacco products through surrogate means such as brand stretching. The influence of advertising and promotion on tobacco use by young persons should be eliminated by effectively closing all channels of advertising and promotion of tobacco products.

#### Acknowledgments

The research reported was funded by a grant from the Fogarty International Center (R01TW05952-01; Perry CL, PI). All contributing authors declare that none of them had any competing interest that would influence the results of this study. The funding agency had no role in the study design; in the collection, analysis, and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication. Authors' work was independent of the funding agency's involvement.

A section of this manuscript was presented as a poster at 13th World Conference on Tobacco or Health, July 2006, in Washington, DC. ■

#### REFERENCES

1. US Department of Health and Human Services. Preventing Tobacco Use among Young People. A Report of the Surgeon General, Washington: US Government Printing Office, CDC. NCCDPHP.1994:161
2. Evans N, Farkas A, Gilpin E, et al. Influence of tobacco marketing and exposure to smokers on adolescent susceptibility to smoking. *J Natl Cancer Inst.* 1995;87:1538-1545.
3. Unger JB, Cruz TB, Schuster D, et al. Measuring exposure to pro- and anti-tobacco marketing among adolescents: intercorrelations among measures and associations with smoking status. *J Health Commun.* 2001;6(1):11-29.
4. Pierce JP, Choi WS, Gilpin EA, et al. Tobacco industry promotion of cigarettes and adolescent smoking. *JAMA.* 1998;279(7):511-515.

5. Choi WS, Ahluwalia JS, Harris KJ, et al. Progression to established smoking: the influence of tobacco marketing. *Am J Prev Med.* 2002;22(4):228-233.
6. Sargent JD, Dalton MA, Beach M, et al. Cigarette promotional items in public schools. *Arch Pediatr Adolesc Med.* 1997;151(12):1189-1196.
7. Pierce JP, Gilpin EA. A historical analysis of tobacco marketing and the uptake of smoking by youth in the United States: 1890-1977. *Health Psychol.* 1995;14(6):500-508.
8. Pierce JP, Gilpin EA, Burns D, et al. Does tobacco advertising target young people to start smoking? Evidence from California. *JAMA.* 1991;266(22):3154-3158.
9. Reddy KS, Shah B, Varghese C, et al. Responding to the threat of chronic diseases in India. *Lancet.* 2005;366:1744-1749.
10. Reddy KS, Gupta PC (eds). Report on Tobacco Control in India. Ministry of Health and Family Welfare, Government of India, New Delhi, 2004.
11. Bloomberg News. Altria's plans for Marlboro in India face ad ban, habit change (online). Available at: <http://bloomberg.com/apps/news?pid=10000103&sid=akUJ2cGshYA&refer=us>. Accessed August 30, 2006.
12. Centers for Disease Control and Prevention. Global Youth Tobacco Survey (GYTS), Delhi, India Fact Sheet. Available at: [http://www.cdc.gov/tobacco/global/gyts/factsheets/2001/India\\_delhi\\_factsheet.htm](http://www.cdc.gov/tobacco/global/gyts/factsheets/2001/India_delhi_factsheet.htm). Accessed January 16, 2006.
13. Centers for Disease Control and Prevention. Global Health Tobacco Survey (GYTS), Tamil Nadu, India Fact Sheet (online). [http://www.cdc.gov/tobacco/global/gyts/factsheets/2001/India\\_TamilNadu\\_factsheet.htm](http://www.cdc.gov/tobacco/global/gyts/factsheets/2001/India_TamilNadu_factsheet.htm). Accessed January 16, 2006.
14. Vaidya SG, Naik UD, Vaidya JS. Effect of sports sponsorship by tobacco companies on children's experimentation with tobacco. *BMJ.* 1996;313:400.
15. Nichter M, Nichter M, Sickle V. Popular perceptions of tobacco products and patterns of use among male college students in India. *Soc Sci Med.* 2004;59:415-431.
16. Reddy KS, Arora M. Ban on tobacco use in films and television represents sound public health policy. *Natl Med J India.* 2005;18(3):115-118.
17. Reddy KS, Perry CL, Stigler MH, et al. Differences in tobacco use among people in urban India by sex, socioeconomic status, age and school grade: assessment of baseline survey data. *Lancet.* Feb 18 2006; 367: 589-594.
18. Stigler MH, Perry CL, Arora M, et al. Why are urban Indian 6th graders using more tobacco than 8th graders? findings from Project MYTRI. *Tob Control.* 2006;15(1):54-60.
19. Perry CL, Stigler MH, Arora M, et al. Prevention in translation: tobacco use prevention in India (Electronic version). Health Promotion Practice. <http://hpp.sagepub.com>. Accessed August 30, 2006.
20. Norman GR, Streiner DL. Biostatistics: The Bare Essentials . St. Louis: Mosby Yearbooks, 1994
21. Raudenbush SW, Bryk AS. Hierarchical Linear Models: Applications and Data Analysis Methods (2nd Edition). Thousand Oaks, CA: Sage Publications, 2002.
22. Murray DM. Design and Analysis of Group-Randomized Trials. New York, NY: Oxford University Press, 1998.
23. Feighery E, Borzekowski DL, Schooler C, et al. Seeing, wanting, owning: the relationship between receptivity to tobacco marketing and smoking susceptibility in young people. *Tob Control.* 1998;7(2):123-128.
24. Sargent JD, Dalton M, Beach M. Exposure to cigarette promotions and smoking uptake in adolescents: evidence of a dose-response relation. *Tob Control.* 2000;9(2):163-168.
25. Schooler C, Feighery E, Flora JA. Seventh graders' self-reported exposure to cigarette marketing and its relationship to their smoking behavior. *Am J Public Health.* 1996;86(9):1216-1221.
26. Bansal R, John S, Ling PM. Cigarette advertising in Mumbai, India: targeting different socioeconomic groups, women and youth. *Tob Control.* 2005;14:201-206.