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Impact of tobacco advertisements on tobacco use among urban adolescents in India: results from a longitudinal study

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Abstract

Objectives—To examine the longitudinal relationship between exposure and receptivity to tobacco advertisements and progression towards tobacco use among adolescents in India.

Design and setting—A 2-year longitudinal group-randomised trial, Mobilizing Youth for Tobacco Related Initiatives (MYTRI), was undertaken from 2004 to 2006 in 32 schools in Delhi and Chennai. Among the control schools (n=16), mixed-effects regression models were used to assess the objectives.

Subjects—Students who were non-susceptible, never users of tobacco (n=2782) at baseline (2004) in the control schools of Project MYTRI, who progressed academically and were followed up at endline (2006).

Main outcome measures—Progression towards tobacco use (on tobacco uptake continuum).

Results—Bivariate results suggest that exposure to tobacco advertisements at baseline was associated in a dose-dependent manner with progression at endline. Students exposed at more than four places were 1.5 times (95% CI 1.12 to 1.94; p<0.05) more likely to progress towards tobacco use at endline versus those not exposed. Among boys, those exposed at more than four places were 1.7 times more likely to progress (95% CI 1.14 to 2.62; p<0.05). These significant results disappeared in multivariate analysis, when other psychosocial risk factors for tobacco use were controlled. In both bivariate and multivariate analyses, the risk of progression at endline was more

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Competing interests

None.

Patient consent

Parents provided passive informed consent and students provided written informed assent.

Ethics approval

This study was conducted with the approval of the Independent Ethics Committee, Mumbai, India, and Institutional Review Boards at the University of Minnesota and University of Texas, USA.

Provenance and peer review

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than two times higher (95% CI 1.28 to 4.32; $p < 0.05$) among boys who were highly receptive versus non-receptive boys. The same relationship did not hold among girls.

Conclusion—High receptivity to tobacco advertising predicts future progression to tobacco use among boys in India. Suggestive evidence exists of a causal relationship between tobacco marketing and adolescent tobacco use.

INTRODUCTION

Tobacco use among Indian adolescents, particularly younger cohorts, poses an enormous public health challenge with the prevalence of ever tobacco use being 14.7% as determined from the project Mobilizing Youth for Tobacco Related Initiatives (MYTRI), a randomised intervention trial conducted among school going adolescents in India.¹ Results from the Global Youth Tobacco Survey (GYTS) in India suggest that there has been an increase of 0.9% in the prevalence of any tobacco use and 0.6% in the prevalence of smoking as well as other forms of tobacco use for over 3 years among youth between the ages of 13 and 15 years, with the prevalence of all forms of tobacco consumption being higher among boys than girls.²³

The Indian tobacco control law prohibits direct and indirect advertisement of tobacco products,⁴ but it does not prohibit 'in pack', 'on pack' and 'point-of-sale' advertisements. Point-of-sale advertising of tobacco products has mushroomed since the implementation of the Indian tobacco control law in 2004.⁵ Tobacco companies employ several sophisticated campaigns to market their products to men, women and children from different socioeconomic groups.⁶ Indirect advertising is widely employed by the tobacco industry in India. For example, Red and White, a famous cigarette brand of Godfrey Phillips India (a Phillip Morris affiliate), has sponsored the so-called 'bravery awards' since 1990.⁶ These awards are intended to indirectly associate the brand with concepts of courage and bravery in an effort to market their product. According to GYTS (India), the proportion of adolescents exposed to pro-tobacco advertisements on billboards in the past 30 days increased from 71.6% in 2006 to 74.4% in 2009, which indicates a growing problem of tobacco marketing for this age group.²³

Evidence strongly suggests that exposure to promotional activities for tobacco leads to initiation and progression of tobacco use among children and adolescents.⁷ McGuire's communication persuasion theory states that exposure typically precedes receptivity to a message, which, in turn, is associated with a higher likelihood of persuasion and adoption of the advocated behaviour.⁸ For example, following exposure to tobacco promotions, children and adolescents develop positive attitudes, beliefs and expectations about the marketing and use of tobacco, which, in turn, lead to the development of intentions and susceptibility to smoke ('at risk' cognitions).⁹ Moreover, susceptibility to smoking has been shown to double the risk of future smoking among adolescent never smokers.¹⁰ Being receptive to tobacco promotions, for example, owning or being willing to use a tobacco promotional item or having a favourite cigarette advertisement, has also been shown to be associated with smoking behaviour among adolescents.^{11–13} Thus, smoking behaviour has been suggested to progress along a continuum of stages.⁹ The majority of earlier studies have been undertaken

in developed countries and focus typically only on one form of tobacco use, that is, cigarette smoking. India has a unique tobacco problem due to the myriad forms in which tobacco is used. The easy availability and use of both smokeless and smoking forms of tobacco especially render adolescents vulnerable to tobacco use.¹⁴

In 2004, the baseline survey of Project MYTRI suggested that exposure and receptivity to tobacco advertising were significantly related to higher rates of tobacco use among students, with a clear dose–response relationship.¹⁵ This current longitudinal study aims to answer two main research questions: (1) whether exposure to tobacco advertising in 2004 is predictive of future tobacco use among these adolescents in 2006 and (2) whether receptivity to tobacco advertising or promotion is predictive of future tobacco use among adolescents. This study examines lagged relationships between these variables in a large sample of Indian youth.

METHODS

Study design and participants

Project MYTRI was a 2-year multi-component, school-based intervention undertaken in 32 schools (16 intervention and 16 control) and covering 14 063 students (10–16 years of age) in Delhi and Chennai, India.¹⁶ The aim of the study was to reduce the use of tobacco among the participating adolescents. The intervention consisted of behavioural classroom curricula, school posters, a component of parental involvement and peer-led activism. The outcomes of Project MYTRI are discussed elsewhere.¹⁶ The current study focuses exclusively on the students in the control schools of Project MYTRI. The sample size of the control group was 6368 in 2004 and 4956 in 2006. The response rates for students in the control group were 94% in 2004 and 79.6% in 2006.¹⁷

The students eligible for these analyses included those who had never used tobacco in their lifetime (never users) and did not have at-risk cognitions (intentions and susceptibility to use tobacco) at baseline ($n=4659$). Of these, we excluded those who were not followed at endline and those who failed to progress academically because in earlier studies, tobacco use has been reported to be higher among failures than those who progressed.¹⁷ Attrition analysis was carried out to compare the study sample ($n=2782$) with those who were lost to follow-up ($n=1877$). There were no statistically significant differences in exposure and receptivity to tobacco advertising between the two groups. The analysis indicated that among those lost to follow-up, there were significantly more boys than girls, 8th graders than 6th graders, students from Delhi than from Chennai and older students than younger students ($p<0.01$).

Measures

Dependent variables—The outcome measure in this study was ‘progression towards tobacco use’ (on the tobacco uptake continuum) defined as progression of a non-susceptible never tobacco user at baseline towards susceptibility to tobacco use or ever tobacco use at endline. Pierce *et al* have used a similar outcome measure for smoking exclusively in an

earlier study.¹⁸ Ever tobacco use and susceptibility (including intentions) to use tobacco were defined as follows.

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)?’ Response options were: ‘I have never smoked/chewed tobacco’, followed by a list of ages at first use. Ever using tobacco was coded for respondents who indicated their age of first use in response to any of the three items.

Sixteen questions grouped under four sections were used to measure susceptibility to use tobacco: (1) intentions to chew tobacco in the future (eg, ‘Do you think you will chew tobacco when you are an adult?’); (2) intentions to smoke tobacco in the future (eg, ‘Do you think you will try smoking cigarettes or *bidis* in the next year?’); (3) social susceptibility to chew tobacco (eg, ‘If one of your close friends gave you chewing tobacco, would you chew it?’); (4) social susceptibility to smoke tobacco (eg, ‘If a group of friends gave you a cigarette or a *bidi*, would you smoke it?’). Each of these items had four options under it: ‘surely yes’, ‘may be yes’, ‘may be no’ and ‘surely no’. If a student answered ‘surely yes’ or ‘may be yes’ for any of these, he/she was considered to be susceptible to use tobacco. Such measures have been used earlier to define susceptibility to smoking.¹⁰

Independent variables—The definitions used for receptivity and exposure to tobacco advertising or promotion were the same as those used in the cross-sectional study.¹⁵ Receptivity has been defined in a similar way by Choi and colleagues.¹² The measure of exposure to tobacco advertising was defined in a slightly different manner from the existing literature, which is largely from developed countries.^{19,20} This measure was adapted for Indian students to accommodate the complexity of the varied methods of advertising and myriad varieties of tobacco products in India, and also for easy comprehension by Indian students.

An index of receptivity to tobacco advertising or promotion was created by combining responses to three items: ‘Do you have a favourite tobacco advertisement?’; ‘Do tobacco advertisements show real-life situations?’ and ‘Would you ever wear or use an item that has the name of a tobacco product on it?’ Based on the responses, three levels of receptivity were created: (1) highly receptive—responded ‘Yes’ to two or all three questions; (2) moderately receptive—responded ‘Yes’ to one of the three questions; (3) not at all receptive—responded ‘No’ to all three questions.

An exposure measure counted the number of venues where students reported seeing tobacco advertising. This measure was formed by combining responses to options listed under the question ‘Have you seen any advertisement for tobacco?’. The seven 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 and cultural events. Using the responses to these seven options, three levels of exposure to tobacco advertisements were created: (1) highly exposed—seen tobacco advertisements at more than four places; (2) moderately exposed—seen tobacco advertisements at one to four places; (3) not exposed—not seen tobacco advertisements at any of the listed places.

Five psychosocial risk factors known to be associated with tobacco use among the youth in India were assessed.²¹ Multi-item summative scales were created by adding up the scores of responses to selected items in the surveys. Table 1 gives an overview of the scales used in this study. All psychosocial factors were coded such that a high score implied higher risk (advocacy skill self-efficacy and reason not to use were inversely coded). Reasons to use and normative beliefs had mean values of 1.84 and 0.88, respectively, but the median for both was zero, which implied that half of the students picked the lowest response. Hence, to ensure ease of interpretation, the psychosocial factors were converted into binary variables by splitting them from their median value.

Data analysis

The prevalence of progression towards tobacco use, its 95% CIs and p values for difference between groups were derived by using the lsmeans (least squares means) option of proc GLM in SAS (V.9.1). Simple logistic regression models were used to examine how progression towards tobacco use was associated with exposure, the level of receptivity and psychosocial factors. Mixed-effects logistic regression models were then used to examine these associations. However, variables found to be significantly associated with progression towards tobacco use in bivariate analyses were adjusted in mixed-effects models. Only complete cases were considered when the variables were included in the model for adjustment. Mixed-effects models are appropriate for study designs like these because they appropriately account for the variability between students and schools in the dependent variable.²² Schools were treated as a nested random effect in the model. Gender was examined as a potential effect modifier in logistic regression models. In addition, a sensitivity analysis was conducted to determine whether the results differed if the psychosocial risk factors were included as continuous rather than dichotomous measures in the models.

RESULTS

Total progression towards tobacco use by demographic variables

Out of 4659 non-susceptible never tobacco user students at baseline, 2782 (59.7%) were followed at endline. In the final sample, 43.4% participants were boys, 62.2% were from government schools and 34.2% were from Delhi (data not shown).

Table 2 shows the proportion of students followed from baseline to endline and the prevalence of progression towards tobacco use by their demographic profile. Overall, 31.53% of the students progressed towards tobacco use. Boys progressed more as compared with girls (38.24% vs 26.41%; $p<0.05$). Students of private schools (38.72%) and from Delhi (43.07%) progressed significantly more than students of government schools (27.15%) and from Chennai (25.52%). A greater proportion of older students progressed towards tobacco use as compared with younger students ($p<0.05$).

Progression towards tobacco use by exposure, receptivity and psychosocial factors

Table 3 shows the crude ORs and 95% CI for different predictor variables associated with progression towards tobacco use. Table 4 describes the relationship between progression towards tobacco use and predictor variables in terms of adjusted ORs.

Exposure—Out of the total students, 2764 (99.4%) responded to questions on exposure to tobacco advertising at baseline. Of these, 36.5% (n=1009) students responded that they had seen tobacco advertisements at more than four places, 50.7% (n=1401) were exposed at one to four places and 12.8% (n=354) had never seen any tobacco advertisements. Bivariate logistic regression analysis (table 3) shows that baseline exposure to tobacco advertisements was related with progression towards tobacco use at endline in a dose-dependent manner. Progression was 1.5 times higher ($p<0.05$) among those who had seen tobacco advertisements at more than four places, while it was about 1.4 times higher ($p<0.05$) among those who had seen them at one to four places, as compared with those who had never seen the advertisements. This relationship was also significant among boys as the progression was 1.7 times higher ($p<0.05$) among those who had seen tobacco advertisements at more than four places, while it was 1.6 times higher ($p<0.05$) among those who had seen them at one to four places, as compared with those who had never seen the advertisements. No significant relationship was demonstrated among girls. Multivariate analysis did not show any significant relationship between exposure and progression (table 4).

Receptivity—Out of the total students, 2682 (96.4%) responded to questions on receptivity to tobacco advertising at baseline. Of these, 3.4% (n=92) were categorised as highly receptive, 27.5% (n=736) were moderately receptive and 69.1% (n=1854) were not at all receptive. Bivariate analysis (table 3) shows that progression towards tobacco use was 1.4 times more likely among highly receptive and 1.2 times more likely among moderately receptive students as compared with those who were not at all receptive. However, these relationships were not significant at 5% level of significance. The odds of progression among highly receptive boys were 2.4 as compared with those who were not at all receptive ($p<0.05$). No significant relationships were demonstrated among girls. When adjusted for all the variables significantly associated with progression, this relationship did not change much (table 4).

Psychosocial factors—Table 3 shows that high scores on the scales of reasons to use tobacco (OR 1.3), normative beliefs (OR 1.5) and advocacy skill self-efficacy (OR 1.9) significantly predicted progression towards tobacco use as compared with low scores on these scales. Among boys, these ORs were 1.5, 1.6 and 1.4, respectively. Among girls, only normative beliefs and advocacy skill self-efficacy were significantly associated with progression towards tobacco use, the ORs being 1.4 and 1.6, respectively. The multivariate analysis (table 4) failed to demonstrate any significant association between psychosocial risk factors and progression in the overall sample as well as separately among boys and girls. Modelling these psychosocial factors as continuous variables in a sensitivity analysis did not affect these results (data not shown).

DISCUSSION

This is the first study in India that has explored a longitudinal relationship between tobacco advertising and progression towards tobacco use (along tobacco uptake continuum) among urban Indian adolescents. Gender differences in this relationship have been explored for the first time. Also, this is the first study to have explored these relationships across all types of tobacco products, whereas earlier literature from developed countries had assessed these relationships for exposure and receptivity to cigarette advertising only.^{18,20} Overall, 87.2% of the students in this study reported being exposed to tobacco advertisements and promotions, though advertising, sponsorship and promotion of tobacco products are prohibited under Section 5 of the Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply and Distribution) Act (COTPA), 2003.⁴ This section prohibits advertising of tobacco products both in direct and indirect forms. These findings are comparable with the results of the GYTS (2009), which reveal that three-quarters of students in India are exposed to pro-tobacco advertisements through billboards.³ This finding highlights weak enforcement of Section 5 of the COTPA, which calls for immediate attention of the policymakers.

Our measure of receptivity was based on the McGuire's communication persuasion theory.⁸ According to this theory, the development of positive affective response to communication (eg, having a favourite tobacco advertisement or being willing to use tobacco promotional items) classifies a person as highly receptive to tobacco advertising.^{23,24} The results of our previous cross-sectional study suggest that receptivity to tobacco advertising is significantly associated with higher rates of tobacco use among adolescents in a dose-response manner.¹⁵ Extending the results longitudinally, the current study suggests that boys who are highly receptive to tobacco promotions have 2.36 times higher risk of progression towards tobacco use than those who are non-receptive. However, this relationship is not significant among girls. This study overcomes the possibility of reverse causation in the relationship between receptivity to tobacco advertising and promotion and tobacco use among adolescents, which was cited as a limitation in our previous cross-sectional study.¹⁵ The results are consistent with the hierarchy of effects model, wherein cognitive effects (receptivity) precede behaviour change (progression towards tobacco use).⁸ Previous studies in developed countries have demonstrated the odds of progression along the tobacco uptake continuum to be 1.71 (95% CI 1.11 to 2.61),¹² and 2.89 (95% CI 1.47 to 5.68)¹⁸ for highly receptive adolescents. The OR for receptivity among boys in our study is in a similar range.

Exposure to tobacco advertisements and tobacco use among students were previously shown to be significantly associated in a dose-response manner.¹⁵ Due to the cross-sectional nature of that study, we were not able to interpret a causal relationship. In the current study, though a dose-response relationship was observed between exposure and progression along the tobacco uptake continuum, the associations were non-significant in multivariate models. It is likely that the bivariate association between exposure and progression was a product of selective exposure (ie, those participants who were already at higher risk for tobacco use due to other reasons, such as demographic or psychosocial factors, were more likely to be exposed to tobacco advertisements) and the resulting associations. As a result, when these

variables were accounted for in the multivariate models, the relationship was no longer significant.

Earlier studies have shown progression on the tobacco uptake continuum to be higher among boys than girls over time.¹²¹⁸²⁰ Likewise, our study found that in India, boys run a greater risk of progression than girls. It might be the case that boys in India are more exposed and receptive to tobacco advertising and promotions than girls as suggested by the fact that these variables have stronger associations with progression among boys. Also, in the case of developing countries such as India, girls have traditionally been victims of social exclusion and limited mobility,²⁵ which means they are more likely to have lower exposure to tobacco promotions and, hence, run a lower risk of developing a positive cognitive response towards tobacco promotions and use (compared with boys) as per the hierarchy of effects model.⁸

Several psychosocial influences have been shown to influence tobacco use among youth in the Indian context such as reasons to use and not use tobacco, perceived prevalence and normative beliefs.²¹ Such social influences at the baseline have the potential to impact tobacco use at the endline.⁹ We controlled for these variables in multivariate regression models to minimise confounding. This study provides evidence that receptivity to tobacco marketing predicts progression towards tobacco use among adolescent boys in India.

Limitations

The study sample was not representative of all Indian adolescents, so the results cannot be generalised beyond students who are making satisfactory progress in school. There are a variety of risk factors (such as sensation seeking, parent and peer tobacco use) which were not measured and which could explain the observed results. However, no observational study can account for all third-variable explanations and we have taken some care to include a number of variables that were appropriately ruled out. The results rely on self-report of tobacco use without biochemical or observed validation.

CONCLUSION

Progression towards tobacco use is higher among boys than girls over time in the Indian context. High receptivity to tobacco advertising among boys is significantly associated with progression towards tobacco use (on the tobacco uptake continuum). Boys can, therefore, be considered to be vulnerable to the tobacco industry's marketing strategies, which make them receptive to tobacco advertisements and ultimately contribute to their progression towards tobacco use. Moreover, high exposure to tobacco advertising reported in this study, though prohibited by Indian law, suggests poor enforcement of Section 5 of the Indian tobacco control law. The results of this study clearly demonstrate a temporal relation and dose-response effect between tobacco advertising and progression to tobacco use, fulfilling two of Hill's criteria for determining causality.²⁶ The evidence here appears suggestive of a causal relationship between receptivity to tobacco use and progression towards tobacco use among adolescent boys in urban India. The National Cancer Institute suggests that a causal relationship exists between tobacco advertising/promotion and increased initiation of smoking.⁹ This paper demonstrates that although India is a very different country with different patterns of tobacco use, the same relationship applies.

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What this paper adds

- Research evidence from the developed countries strongly suggests that exposure to tobacco promotional activities leads to initiation and continuation of tobacco use among adolescents. An earlier cross-sectional study from India also supported this association. No longitudinal study has assessed this lagged relationship in the Indian context till date. Earlier studies have focused only on cigarette smoking, whereas India has a unique problem due to myriad varieties of tobacco products. This longitudinal study was undertaken to address these research gaps.
- The results suggest that high receptivity to tobacco advertising in 2004 was associated with progression towards tobacco use in 2006 only among boys, but not among girls. Despite a comprehensive tobacco control law in India, which prohibits direct and indirect advertising and promotion of tobacco products, 82.7% students reported being exposed to such marketing strategies. This calls for immediate attention of policymakers to strengthen the advertising ban in India.

Table 1

Multiple item summative scales used to measure psychosocial factors (n=2782)

Psychosocial factors [*]	Items	Range	Mean (SD) [†]	Cronbach's alpha [†]	Median [†]	Example
Reasons to use	6	0–18	1.84 (2.61)	0.62	0.00	Does using tobacco make a person appear more brave and grown up?
Reasons not to use	5	0–15	6.52 (5.53)	0.84	6.00	I would not want to use tobacco because I would be breaking my parents' rules.
Normative beliefs	6	0–18	0.88 (1.91)	0.67	0.00	Is it okay for people of your age to try tobacco out of curiosity?
Perceived prevalence	8	0–24	9.40 (3.75)	0.78	9.00	How many adult males in India do you think smoke tobacco regularly?
Advocacy skill self-efficacy	8	0–24	5.45 (7.03)	0.93	3.00	Do you think you could help a friend to try to stay away from tobacco?

^{*} The psychosocial factors were coded such that a high score implied higher risk.

[†] Values are given for baseline (2004).

Table 2

Demographic information on adolescents studied

Demographic variables	n At baseline (2004)	Proportion followed at endline (2006)	Proportion progressing towards tobacco use (2006)
	n	n (%) [†]	Prevalence (95% CI) [‡]
Overall	4659	2782 (59.7)	31.53 (29.8 to 33.27)
Gender			
Girls	2339	1575 (67.34)	26.41 (24.12 to 28.69)
Boys	2320	1207 (52.03)	38.24 (35.63 to 40.86) *
Class			
6th grade cohort	2303	1417 (61.53)	30.77 (28.34 to 33.20)
8th grade cohort	2356	1365 (57.94)	32.32 (29.85 to 34.80)
School			
Private	1766	1052 (59.57)	38.72 (35.92 to 41.52)
Government	2893	1730 (59.80)	27.15 (24.96 to 29.33) *
City			
Delhi	2256	952 (42.20)	43.07 (40.15 to 45.99)
Chennai	2403	1830 (76.15)	25.52 (23.42 to 27.63) *
Age (years)			
10	667	501 (75.11)	26.01 (21.92 to 30.09)
11	1221	806 (66.01)	30.54 (27.32 to 33.76)
12	1150	671 (58.35)	31.53 (28.01 to 35.06)
13	1011	540 (53.41)	34.79 (30.96 to 38.82)
14 and above	594	254 (42.76)	39.29 (33.56 to 45.02) *

* p<0.05.

[†]Percentage shows the proportion from baseline data for a particular group.[‡]Prevalence and 95% CI obtained using simple regression model.

Table 3

Bivariate association of exposure, receptivity and related factors of adolescents at baseline (2004) with progression towards tobacco use at endline (2006)

Measures (2004)	Progression towards tobacco use (2006)		
	Overall [†] (n=2782)	Boys [†] (n=1207)	Girls [†] (n=1575)
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Exposure			
0 places	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
1–4 places	1.39 [*] (1.06 to 1.81)	1.62 [*] (1.08 to 2.43)	1.19 (0.84 to 1.69)
>4 places	1.47 [*] (1.12 to 1.94)	1.73 [*] (1.14 to 2.62)	1.24 (0.86 to 1.79)
Receptivity			
Not at all receptive	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Moderately receptive	1.16 (0.96 to 1.39)	1.30 (0.99 to 1.71)	1.08 (0.84 to 1.39)
Highly receptive	1.44 (0.94 to 2.23)	2.35 [*] (1.31 to 4.24)	0.65 (0.30 to 1.41)
Demographic variables			
Gender			
Girls	1.00 (Reference)	–	–
Boys	1.73 [*] (1.47 to 2.03)	–	–
Class			
6th grade cohort	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
8th grade cohort	1.08 (0.92 to 1.26)	1.34 [*] (1.06 to 1.69)	0.88 (0.70 to 1.10)
School			
Government	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Private	1.70 [*] (1.44 to 2.00)	1.48 [*] (1.17 to 1.87)	1.66 [*] (1.32 to 2.11)
City			
Chennai	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Delhi	2.21 [*] (1.87 to 2.61)	1.65 [*] (1.30 to 2.08)	2.54 [*] (1.99 to 3.24)
Age (years)			
10	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
11	1.25 (0.97 to 1.61)	1.03 (0.70 to 1.51)	1.35 (0.97 to 1.89)
12	1.31 [*] (1.01 to 1.70)	1.36 (0.91 to 2.04)	1.22 (0.87 to 1.73)
13	1.52 [*] (1.17 to 1.99)	1.38 (0.93 to 2.06)	1.42 (0.98 to 2.06)
14 and above	1.84 [*] (1.33 to 2.54)	1.51 (0.95 to 2.40)	1.85 [*] (1.16 to 2.96)
Psychosocial factors [‡]			
Reasons to use			
Low	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
High	1.34 [*] (1.14 to 1.57)	1.54 [*] (1.22 to 1.95)	1.24 (0.99 to 1.56)
Reasons not to use			
Low	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
High	1.00 (0.85 to 1.18)	0.94 (0.74 to 1.19)	1.05 (0.84 to 1.32)

Measures (2004)	Progression towards tobacco use (2006)		
	Overall [†] (n=2782)	Boys [†] (n=1207)	Girls [†] (n=1575)
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Normative beliefs			
Low	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
High	1.50 [*] (1.26 to 1.79)	1.62 [*] (1.26 to 2.10)	1.40 [*] (1.09 to 1.78)
Perceived prevalence			
Low	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
High	1.14 (0.97 to 1.34)	1.19 (0.94 to 1.51)	1.08 (0.87 to 1.36)
Advocacy skill self-efficacy			
Low	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
High	1.92 [*] (1.29 to 2.79)	1.44 [*] (1.14 to 1.82)	1.56 [*] (1.24 to 1.96)

^{*} p<0.05.

[†] ORs and 95% CIs obtained using simple logistic regression models.

[‡] Summative scale score split by median. High score implies higher risk.

Table 4

Multivariate association of exposure, receptivity and related factors (2004) with progression towards tobacco use at endline (2006)

Measures (2004)	Progression towards tobacco use (2006)		
	Overall (n=2637) [†]	Boys (n=1138) [‡]	Girls (n=1507) [§]
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Exposure			
0 places	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
1–4 places	1.17 (0.88 to 1.56)	1.24 (0.80 to 1.92)	1.14 (0.78 to 1.67)
>4 places	1.24 (0.92 to 1.67)	1.34 (0.86 to 2.10)	1.18 (0.79 to 1.77)
Receptivity			
Not at all receptive	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Moderately receptive	1.13 (0.93 to 1.37)	1.29 (0.98 to 1.72)	1.02 (0.78 to 1.33)
Highly receptive	1.23 (0.79 to 1.93)	2.36 [*] (1.28 to 4.32)	0.55 (0.25 to 1.23)

^{*} p<0.05.

[†] Mixed effects logistic regression. Adjusted for demographic variables (gender, school type, city and age) and psychosocial factors (reasons to use, normative beliefs and advocacy skill self efficacy). School specified as random effect for adjustment. n Represents complete cases.

[‡] Multiple logistic regression models. Adjusted for demographic variables (class, school type and city) and psychosocial factors (reasons to use, normative beliefs and advocacy skill self efficacy). n Represents complete cases.

[§] Mixed effects logistic regression. Adjusted for demographic variables (school type, city and age) and psychosocial factors (normative beliefs and advocacy skill self efficacy). School specified as random effect for adjustment. n Represents complete cases.