

## Association of Retail Tobacco Marketing With Adolescent Smoking

Lisa Henriksen, PhD, Ellen C. Feighery, RN, MS, Yun Wang, MS, and Stephen P. Fortmann, MD

A survey of 2125 middle-school students in central California examined adolescents' exposure to tobacco marketing in stores and its association with self-reported smoking. Two thirds of sixth-, seventh-, and eighth-grade students reported at least weekly visits to small grocery, convenience, or liquor stores. Such visits were associated with a 50% increase in the odds of ever smoking, even after control for social influences to smoke. Youth smoking rates may benefit from efforts to reduce adolescents' exposure to tobacco marketing in stores. (*Am J Public Health*. 2004;94:2081–2083)

The tobacco industry spends more on point-of-purchase marketing than on all other forms of cigarette advertising combined (\$9.5 billion vs \$1.7 billion in 2001).<sup>1</sup> Since the ban on billboard advertising, promotional materials for to-

bacco have increased significantly on store windows and around the counter.<sup>2,3</sup> Three out of 4 teenagers shop at a convenience store at least once a week,<sup>4</sup> staying an average of 16 minutes per visit—twice as long as adults.<sup>5</sup> In recent surveys, all 15- and 16-year-olds reported seeing point-of-purchase marketing for cigarettes,<sup>6</sup> and teenaged smokers preferred whichever brand (Marlboro or Camel) was advertised most heavily in the convenience store nearest their school.<sup>7</sup> Experimental studies suggest that retail tobacco marketing exposure distorts adolescents' perceptions about the availability, use, and popularity of tobacco<sup>8,9</sup>—normative beliefs that are precursors of smoking.<sup>10–12</sup>

The only study to correlate adolescents' self-reported smoking with exposure to retail tobacco marketing found that experimentation was 38% more likely for seventh-grade students who said that they visited a convenience, liquor, or small grocery store at least weekly and remembered seeing advertisements for cigarettes sometimes or a lot.<sup>13</sup> Because cigarette advertising is more noticeable to experimenters than to abstinent youths,<sup>14,15</sup> this finding may be attributable to perceived exposure alone. Alternatively, store exposure may be associated with smoking for reasons other than the influence of advertising, such as a propensity for risk taking or lack of after-school supervision, which are established risk factors for smoking.<sup>11,16,17</sup> After we controlled for such risk factors and social influences to smoke, we examined whether adolescent smoking is associated with exposure to stores that contain widespread tobacco marketing.

### METHODS

We administered the Survey of Teen Opinions about Retail Environments (STORE Study) in all 3 middle schools in Tracy, Calif (population 62 500), in spring 2003. Of the initial sample of sixth-, seventh-, and eighth-grade students (N=2731), 396 students did not return parental consents, 95 were absent for the survey, and 115 parents refused permission, yielding a response rate of 78%. The final sample (N=2125) was 53% female and 42% Hispanic, 27% White, 11% Asian, 6% African American, 1% American Indian, 1% Pacific Islander, and 12% multiethnic.

Each survey included photographs and addresses of 12 retail tobacco outlets in the school

catchment area that were identified by student focus groups as popular destinations for purchasing snacks. Exposure to retail tobacco marketing was coded for students who reported at least weekly visits to convenience, liquor, or small grocery stores, either in response to questions about the pictured stores or in response to questions about visiting any such stores in the past month. Exposure to other forms of tobacco marketing was coded for students who reported owning a cigarette promotional item, sometimes or often seeing tobacco advertisements in magazines in the past week, or sometimes or often seeing people smoking on television or in movies in the past week. Exposure to family and peer smoking was coded, separately, for students who reported having a parent or other household member who currently smokes and for students who reported having at least one friend who currently smokes. The survey also included self-reported grades, a 3-item risk-taking measure,<sup>11</sup> and 4 items of the Authoritative Parenting Index<sup>18</sup> that measure maternal supervision.

We used GLIMMIX for SAS, Version 8.0 (SAS Institute Inc, Cary, NC), to examine the potential effect of school clustering with multi-level modeling, but results did not differ from the standard multiple regression reported here. Odds ratios were computed to test the association between adolescents' exposure to retail tobacco marketing and ever smoking a cigarette, even just a puff. This was the primary study outcome because the prevalence of current smoking was quite small: 2.6% of sixth-, 6.0% of seventh-, and 7.6% of eighth-grade students reported any cigarette smoking in the past 30 days.

### RESULTS AND DISCUSSION

Two thirds of the students said that they visited a convenience, liquor, or small grocery store on their way to or from school at least weekly (Table 1); about one fourth of the students reported visiting such stores practically every day. Exposure to retail tobacco marketing was more prevalent among boys; Latino youths; and students who reported low maternal supervision, high risk taking, exposure to social influences to smoke, and exposure to other forms of tobacco marketing.

Table 2 summarizes the bivariate and multivariate associations of ever smoking with de-

mographic attributes and psychosocial risk factors. After we controlled for all other variables in the model, weekly or more frequent exposure to retail tobacco marketing was associated with a 50% increase in the odds of ever smoking—nearly as much as the effect of exposure to a parent or household member who smokes. Although Latino youths were more likely to be exposed to retail tobacco marketing, they had

no greater risk for smoking when other variables were controlled.

Because we controlled for confounders such as risk taking, maternal supervision, and self-reported grades, the association between adolescents' store visits and their smoking behavior appears more likely an effect of advertising exposure than an artifact of idle hands or hanging out with the wrong crowd. Relative to

other forms of tobacco marketing, retail marketing exposure was second only to owning a cigarette promotional item in increasing the odds of ever smoking. However, the smaller association observed for exposure to cigarette advertisements in magazines and no association for depictions of smoking on television or in movies may be an artifact of redundancy within exposure measures.

This cross-sectional study could not confirm a causal role for retail tobacco marketing in the uptake of smoking but provided stronger evidence for causality than previous studies have by controlling several potential confounds.

The effect of retail tobacco marketing on adolescent smoking may be particularly potent in states with comprehensive tobacco control programs where tobacco advertisements and promotions are more numerous at the point of sale.<sup>19,20</sup> Because the tobacco industry has relatively few regulations on advertising in stores,<sup>21–25</sup> further research, including longitudinal studies, is needed to determine how the proliferation of tobacco marketing in stores affects youths. ■

**TABLE 1—Characteristics of Study Participants and Prevalence of Exposure to Retail Tobacco Marketing: 2125 Middle-School Students, Tracy, Calif, 2003**

	% of Full Sample (N = 2125)	Prevalence of Exposure to Retail Tobacco Marketing, %	Unadjusted OR (95% CI)
Grade			
6th <sup>a</sup>	33.2	68.0	
7th	29.8	66.1	0.9 (0.7, 1.2)
8th	37.0	65.2	0.9 (0.7, 1.1)
Gender			
Female <sup>a</sup>	53.3	63.9	
Male	46.7	69.1	1.3 (1.1, 1.5)
Ethnicity			
Not Latino or Hispanic <sup>a</sup>	57.9	59.6	
Latino or Hispanic	42.1	76.0	2.2 (1.8, 2.6)
Self-reported grades			
Above median <sup>a</sup>	52.6	60.2	
Below median	47.4	73.1	1.8 (1.5, 2.2)
Parent or household smoking			
No <sup>a</sup>	55.5	60.3	
Yes	44.5	74.0	1.9 (1.6, 2.3)
At least 1 friend smokes			
No <sup>a</sup>	72.3	61.9	
Yes	27.7	77.9	2.2 (1.7, 2.7)
Maternal supervision			
Above mean <sup>a</sup>	50.6	62.7	
Below mean	49.4	70.0	1.4 (1.2, 1.7)
Risk taking			
Below mean <sup>a</sup>	46.3	56.6	
Above mean	53.7	74.6	2.3 (1.9, 2.7)
Own cigarette promotional item			
No <sup>a</sup>	84.8	63.5	
Yes	15.2	82.8	2.8 (2.0, 3.7)
See cigarette advertisements in magazines			
Never or rarely <sup>a</sup>	48.8	55.4	
Sometimes or often	51.2	76.9	2.7 (2.2, 3.2)
See smoking on television or in movies			
Never or rarely <sup>a</sup>	32.0	55.9	
Sometimes or often	68.0	71.4	2.0 (1.6, 2.4)
Exposure to retail tobacco marketing			
<Once/week <sup>a</sup>	33.8	...	...
At least once/week	66.2	...	...

Note. OR = odds ratio; CI = confidence interval.

<sup>a</sup>Reference category.

#### About the Authors

Lisa Henriksen, Yun Wang, and Stephen P. Fortmann are with the Stanford Prevention Research Center, Stanford University School of Medicine, Stanford, Calif. Ellen C. Feighery is with the Public Health Institute, Oakland, Calif. Requests for reprints should be sent to Lisa Henriksen, PhD, Stanford University School of Medicine, Stanford Prevention Research Center, Hoover Pavilion, 211 Quarry Rd, N2229, Stanford, CA 94305-5705 (e-mail: lhenriksen@stanford.edu; amanda.dauphinee@stanford.edu).

This brief was accepted January 2, 2004.

#### Contributors

L. Henriksen helped design the study and supervised all aspects of its implementation. E. C. Feighery helped design the study and supervised store advertising surveys. Y. Wang assisted with the study and data analyses. S. P. Fortmann helped design the study. All authors helped to interpret findings and review drafts of the brief.

#### Acknowledgments

This study was funded by Public Health Service grant CA67850 from the National Cancer Institute.

We are grateful to Amanda Dauphinee for managing the data collection and project administration; to Harry Haladjian for managing the store observations; to Matthew Barton, Christopher Doyle, Allyson Fish, Shannon Quinlan Hurtz, Dominique Johnson, Lani Ream, and Diana Wu for collecting the data; and to the principals and teachers who supported the study.

#### Human Participant Protection

All students were required to return signed parental consent forms in order to participate in this study.

**TABLE 2—Unadjusted and Adjusted Odds Ratios (ORs) From Stepwise Logistic Regression for Ever Smoking: 2125 Middle-School Students, Tracy, Calif, 2003**

	Unadjusted OR	CI	Adjusted OR <sup>a</sup>	CI
Grade				
6th <sup>b</sup>				
7th	2.7	2.0, 3.7	2.0	1.4, 2.9
8th	4.5	3.3, 6.1	3.0	2.1, 4.3
Gender				
Female <sup>b</sup>				
Male	1.1	0.9, 1.4	NS	
Ethnicity				
Not Latino or Hispanic <sup>b</sup>				
Latino or Hispanic	1.4	1.1, 1.7	NS	
Self-reported grades				
Above median <sup>b</sup>				
Below median	2.7	2.2, 3.4	1.5	1.2, 2.0
Parent or household smoking				
No <sup>b</sup>				
Yes	2.6	2.1, 3.2	1.8	1.4, 2.3
At least 1 friend smokes				
No <sup>b</sup>				
Yes	6.6	5.2, 8.3	3.1	2.4, 4.0
Maternal supervision				
Above mean <sup>b</sup>				
Below mean	1.9	1.5, 2.4	1.5	1.1, 1.9
Risk taking				
Below mean <sup>b</sup>				
Above mean	6.7	5.1, 8.9	3.4	2.5, 4.7
Own cigarette promotional item				
No <sup>b</sup>				
Yes	6.0	4.7, 7.8	2.7	2.0, 3.6
See cigarette advertisements in magazines				
Never or rarely <sup>b</sup>				
Sometimes or often	2.5	2.0, 3.1	1.4	1.1, 1.8
See smoking on television or in movies				
Never or rarely <sup>b</sup>				
Sometimes or often	2.2	1.7, 2.8	NS	
Exposure to retail tobacco marketing				
<Once/week <sup>b</sup>				
At least once/week	2.8	2.1, 3.6	1.5	1.1, 2.1

Note. CI = confidence interval; NS = not selected by stepwise selection method.  
<sup>a</sup>Adjusted OR controls for school differences and all other model variables simultaneously.  
<sup>b</sup>Reference category.

sectional study of young people's awareness of and involvement with tobacco marketing. *BMJ*. 2001;322:513-517.

- Wakefield MA, Ruel EE, Chaloupka FJ, Slater SJ, Kaufman NJ. Association of point-of-purchase tobacco advertising and promotions with choice of usual brand among teenage smokers. *J Health Commun*. 2002;7:113-121.
- Donovan RJ, Jancey J, Jones S. Tobacco point of sale advertising increases positive brand user imagery. *Tob Control*. 2002;11:191-194.
- Henriksen L, Flora JA, Feighery E, Fortmann SP. Effects on youth of exposure to retail tobacco advertising. *J Appl Soc Psychol*. 2002;32:1771-1789.
- Evans RI, Dratt LM, Raines BE, Rosenberg SS. Social influences on smoking initiation: importance of distinguishing descriptive versus mediating process variables. *J Appl Soc Psychol*. 1988;18(11, pt 1):925-943.
- Flay BR, Hu FG, Richardson J. Psychosocial predictors of different stages of smoking among high school students. *Prev Med*. 1998;27(5, pt 3):A9-A18.
- Graham JW, Marks G, Hansen WB. Social influence processes affecting adolescent substance use. *J Appl Psychol*. 1991;76:291-298.
- Schooler C, Feighery E, Flora J. Seventh graders' self-reported exposure to cigarette marketing and its relationship to their smoking behavior. *Am J Public Health*. 1996;86:1216-1221.
- Botvin EM, Botvin GJ, Michela JL, et al. Adolescent smoking behavior and the recognition of cigarette advertisements. *J Appl Soc Psychol*. 1991;21:919-932.
- Unger JB, Cruz TB, Schuster D, Flora JA, Johnson CA. Measuring exposure to pro- and anti-tobacco marketing among adolescents: intercorrelations among measures and associations with smoking status. *J Health Commun*. 2001;6:11-29.
- Flannery DJ, Williams LL, Vazsonyi AT. Who are they with and what are they doing? Delinquent behavior, substance use, and early adolescents' after-school time. *Am J Orthopsychiatry*. 1999;69:247-253.
- Mott JA, Crowe PA, Richardson J, Flay B. After-school supervision and adolescent cigarette smoking: contributions of the setting and intensity of after-school self-care. *J Behav Med*. 1999;22:35-58.
- Jackson C, Henriksen L, Foshee VA. The Authoritative Parenting Index: predicting health risk behaviors among children and adolescents. *Health Educ Behav*. 1998;25:319-337.
- Chaloupka F, Slater S, Wakefield M. USA: price cuts and point of sale ads follow tax rise. *Tob Control*. 1999;8:242.
- Slater S, Chaloupka FJ, Wakefield M. State variation in retail promotions and advertising for Marlboro cigarettes. *Tob Control*. 2001;10:337-339.
- A Bill to Protect the Public Health by Providing the Food and Drug Administration With Certain Authority to Regulate Tobacco Products*, S2626, 107th Cong, 2nd Sess (2002).
- Food and Drug Administration et al. v. Brown & Williamson Tobacco Corp*, F3d 153,155 (US 2000).
- Gardiner P. A reversal of fortune: the framework convention and federal tobacco policy. *Burning Issues*. 2001:8-11.
- Lorillard Tobacco Co. v. Reilly*, 533 US 525, F Supp 2d 76,124 (US 2001).
- Master Settlement Agreement. Washington, DC: National Association of Attorneys General; December 8, 1998.

The parental consent forms explained the study protocol and participant rights. Students also were given a consent form to read and sign before survey administration. The use of human subjects was approved by the human subjects panel of Stanford University.

**References**

- Cigarette Report for 2001*. Washington, DC: Federal Trade Commission; 2003.
- Celebucki CC, Diskin K. A longitudinal study of externally visible cigarette advertising on retail storefronts

in Massachusetts before and after the Master Settlement Agreement. *Tob Control*. 2002;11(suppl 2):ii47-ii53.

- Wakefield MA, Terry-McElrath YM, Chaloupka FJ, et al. Tobacco industry marketing at point of purchase after the 1998 MSA billboard advertising ban. *Am J Public Health*. 2002;92:937-940.
- Point-of-Purchase Advertising Institute. *The Point-of-Purchase Advertising Industry Fact Book*. Englewood, NJ: The Point of Purchase Advertising Institute; 1992.
- Chanil D. Profile of the convenience store customer. *Convenience Store News*. February 11, 2002:54-70.
- MacFadyen L, Hastings G, MacKintosh AM. Cross