

Tobacco Marketing and Adolescent Smoking: More Support for a Causal Inference

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ABSTRACT

Objectives. This prospective study examined the effect of tobacco marketing on progression to established smoking.

Methods. Massachusetts adolescents ($n = 529$) who at baseline had smoked no more than 1 cigarette were reinterviewed by telephone in 1997. Analyses examined the effect of receptivity to tobacco marketing at baseline on progression to established smoking, controlling for significant covariates.

Results. Adolescents who, at baseline, owned a tobacco promotional item and named a brand whose advertisements attracted their attention were more than twice as likely to become established smokers (odds ratio = 2.70) than adolescents who did neither.

Conclusions. Participation in tobacco marketing often precedes, and is likely to facilitate, progression to established smoking. Hence, restrictions on tobacco marketing and promotion could reduce addiction to tobacco. (*Am J Public Health*. 2000;90:407-411)

Despite tobacco industry claims to the contrary, researchers have consistently implicated cigarette marketing activities as an important catalyst in the smoking initiation process.¹ Much of the evidence for a link between advertising and youth smoking is based on cross-sectional or correlational studies.²⁻³⁹ For example, some studies have found a correlation between trends in the intensity of cigarette marketing and trends in the rates of adolescent smoking initiation.^{2,3} Others have shown increases in smoking rates among population subgroups specifically targeted by marketing campaigns.^{4,5} Still others have shown correlations between the intensity of brand-specific cigarette advertising and brand awareness, preference,⁶⁻¹⁴ or brand market shares^{12,15,16} among youths. Many cross-sectional studies have reported associations between exposure to cigarette advertising or participation in promotional activities and attitudes toward smoking,¹⁷ susceptibility to smoking,¹⁸⁻²³ and smoking behavior^{6,9,11,17,19,21,22,24-39} among youths. Because of the cross-sectional nature of these studies, it is not possible to determine whether the exposure to tobacco marketing preceded and contributed to smoking initiation or whether smoking initiation preceded increasing receptivity to tobacco advertising and promotions.

Very few longitudinal studies that prospectively link exposure to tobacco advertising to smoking initiation have been done. Two Australian studies reported higher rates of smoking initiation among youth who 1 or 2 years earlier had indicated approval of cigarette advertising⁴⁰ or reported that cigarette advertisements made smoking appear attractive to them.⁴¹ A Scottish study found that youths with higher awareness of, and liking for, cigarette advertisements at baseline were more likely to develop positive intentions to smoke after a 1-year follow-up period, but a significant effect on smoking behavior was not observed.⁴² Only 1 relevant longitudinal study has been published in the United States. Pierce et al.⁴³ found that receptivity to cigarette promotional activities among California adolescents was associated 3 years later with progression along a 4-point smoking initiation continuum. One third (33%) of those who progressed increased their intentions to smoke, 59% actually experimented with cigarettes, and 7% became established smokers.

Although changes in intentions to smoke have been associated repeatedly with subsequent smoking initiation,⁴⁴⁻⁴⁷ stronger evidence of the power of advertising requires the demonstration of a prospective link with smoking behavior. The present study investigated this link.

Methods

Sample

Data were from the 1993 Massachusetts Tobacco Survey of youths, which was based on a probability sample of Massachusetts housing units drawn by means of random-digit dialing. After conducting a household screening interview with an adult resident, interviewers selected a representative sample of youths. Interviews were completed with 75% of the eligible youths, yielding a final baseline sample of 1606 adolescents, 1069 of whom were between 12 and 15 years of age.⁴⁸

Between November 1997 and February 1998, we attempted to recontact the 1069 youths. We were unable to trace 328 (30.7%) but completed interviews with 618 (83.4%) of the remaining 741 youths for an overall follow-up response rate of 57.8%. These 618 adolescents constituted our final youth cohort. For this research, a subset of the sample was used: those 529 respondents who indicated at baseline that they had smoked no more than 1 cigarette in their lifetime.

Measures

Outcome variable. The outcome measure was a dichotomous indicator of whether the respondent had become an established smoker by smoking 100 or more cigarettes

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by follow-up. This criterion is commonly used to define “ever smokers” among adults.

Predictors: receptivity to tobacco marketing. A 3-level indicator of receptivity to tobacco marketing was constructed from the following 2 survey questions: (1) “Some tobacco companies make clothing, hats, bags, or other things with the brand on it. Do you have a piece of clothing or other thing that has a tobacco brand name or logo on it?” and (2) “Of all the cigarette advertisements you have seen, which brand’s ads do you think attract your attention the most?” The highest level of receptivity was assigned to those who reported owning a promotional item and who named a cigarette brand in response to the second question. Those who either owned an item or named a brand were scored as being moderately receptive to marketing. Those who neither owned an item nor named a brand were scored at the lowest level of receptivity.

Potential confounding variables. To rule out the possibility that some third factor could be responsible for causing both receptivity to tobacco marketing and subsequent progression to established smoking, we included, at baseline, measures of variables that have been associated with smoking initiation to determine whether they also were associated with receptivity to tobacco marketing. These variables included demographic characteristics (age, sex, race/ethnicity, socioeconomic status), social influences (smoking among family members and friends), psychological problems (rebelliousness and depression), and baseline smoking status.^{1,46,47,49,50} If these variables also were associated with receptivity to advertising, failing to control for them in the analysis would leave open the possibility that the link between baseline receptivity to advertising and subsequent progression to established smoking was due to the fact that respondents who have friends or parents who smoke may be more likely to receive promotional items as gifts than those who do not. Rebelliousness or depression may increase the likelihood of both becoming a smoker and being attracted to the images and promotional items associated with particular cigarette brands. Likewise, nonsmoking youths who were ambivalent about smoking in the future, or those who had engaged in early experimentation, might be more receptive to tobacco marketing than those who, at baseline, had a firm commitment not to become a smoker.

To assess these variables, interviewers asked respondents about their age, sex, and race/ethnicity, as well as about the number of their close friends who smoked. The interview with the adult household informant provided information on the number of adult family members who smoked, the educational level

of the adult informant, and the total annual household income. Rebelliousness was measured with 6 items that represent several domains related to problem behavior in adolescence: attraction to risk and danger (e.g., “I get a kick out of doing things that are a little risky or dangerous”⁵¹), poor relationships with family (e.g., “I have a lot of arguments with my family”⁵²), and solidarity with deviant peers (e.g., “I don’t mind lying to keep my friends out of trouble with the authorities”). These items have good face validity and moderate internal consistency (Cronbach $\alpha = .60$). Depression was measured with 6 items adapted from the Center for Epidemiologic Studies Depression Scale,⁵³ which ask how often in the past year the respondents felt hopeless, felt depressed, had trouble sleeping, and so on (Cronbach $\alpha = .71$).

Although the cohort consisted of youths who had smoked no more than 1 cigarette in their lifetime, they were differentiated into 3 smoking risk groups based on whether they had ever had a puff of a cigarette and on their responses to 3 items measuring “susceptibility to smoking,” a measure previously shown to be a valid predictor of smoking initiation.^{44–47} Respondents in the lowest risk group (confirmed nonsmokers) reported never having had even a puff of a cigarette and showed a firm commitment not to smoke in the future by answering “no” to the question “Do you think that you will try a cigarette soon?” and “definitely not” to the questions “If one of your best friends were to offer you a cigarette, would you smoke it?” and “Do you think you will smoke a cigarette during the next year?” Respondents in the moderate risk group (ambivalent nonsmokers) reported never having had a puff of a cigarette but answered “yes” to the question about trying a cigarette soon or gave less definitively negative responses to the other 2 questions. Respondents who reported that they had had a puff or a whole cigarette were classified in the highest risk group (early experimenters).

Data Analysis

To select variables to be included as covariates in the analysis, we examined the bivariate relationships between the potential confounding variables listed above and the main predictor and outcome variables. Any variable significantly associated with both receptivity to tobacco marketing and becoming an established smoker was included as a covariate. We performed a logistic regression analysis with progression to established smoking as the dependent variable, controlling for the selected covariates. We reported adjusted odds ratios (ORs) that reflect the

ratio of the odds of progression to established smoking while controlling for the simultaneous effects of other variables. All analyses were conducted with the SPSS statistical package.⁵⁴

The baseline survey data set included weights that reflected each respondent’s probability of selection. Because the primary objective of this study was to draw conclusions about the effect of tobacco marketing on progression to established smoking among cohort members, rather than to generalize to the state as a whole, we conducted unweighted analyses.

Results

Attrition

To evaluate potential bias in the cohort, we compared the characteristics of baseline nonsmokers who were retained in the sample with those of subjects who were lost to follow-up. The youths who were lost to follow-up were significantly older and more likely to have reported owning a promotional item. They tended to be more rebellious and to have a close friend who smoked, but neither of these differences reached the .05 level of significance. The pattern of differences suggests that youths at higher risk for progression to established smoking were somewhat underrepresented in the cohort.

Characteristics of the Cohort

Table 1 presents the characteristics of the cohort overall and according to their receptivity to tobacco marketing and progression to established smoking. Receptivity was significantly associated with living in a household in which at least 1 adult smoked, having at least 1 close friend who smoked, being an early experimenter, and scoring above the median in rebelliousness.

Twenty-one percent ($n = 110$) of the 529 respondents became established smokers during the 4-year follow-up period. Progression to established smoking was significantly more likely among White than minority youths, among youths who lived with at least 1 adult smoker, among youths who had at least 1 close friend who smoked, among youths who were early experimenters, and among youths who scored high in rebelliousness.

Among those with high receptivity to tobacco marketing (owned a promotional item and named a cigarette brand as attracting their attention), 46% progressed from no smoking or early experimentation to established smoking. The rates for adolescents with moderate and low receptivity were 18% and 14%, respectively ($\chi^2_2 = 28.9, P < .001$).

TABLE 1—Baseline Distribution of Demographic Characteristics and Psychosocial Variables Among Massachusetts Youth Cohort,^a by Receptivity to Tobacco Marketing in 1993 and Progression to Established Smoking by 1997

	Receptivity to Tobacco Marketing in 1993			<i>P</i> ^b	Became Established Smoker by 1997		<i>P</i> ^b	Total (n = 529)
	Low (n = 121)	Moderate (n = 342)	High (n = 66)		Yes (n = 110)	No (n = 419)		
Age group in 1993, y								
12–13	56.7	53.7	57.6	.759	49.1	56.4	.173	54.8
14–15	43.3	46.3	42.4		50.9	43.6		45.2
Sex								
Male	43.0	50.9	54.5	.224	45.5	50.6	.337	49.5
Female	57.0	49.1	45.5		54.5	49.4		50.5
Race/Ethnicity								
White, non-Hispanic	81.2	79.5	83.1	.777	88.0	78.3	.025	80.3
Other	18.8	20.5	16.9		12.0	21.7		19.7
Education of adult informant								
High school or less	40.0	43.1	38.5	.712	48.1	40.1	.131	41.8
More than high school	60.0	56.9	61.5		51.9	59.9		58.2
Household income, \$								
≤50 000	42.3	42.2	35.3	.644	40.7	41.5	.892	41.3
>50 000	57.7	57.8	64.7		59.3	58.5		58.7
At least 1 adult smoker in household								
Yes	29.8	36.8	51.5	.013	50.0	33.7	.002	37.1
No	70.2	63.2	48.5		50.0	66.3		62.9
At least 1 close friend who smokes								
Yes	51.2	60.5	78.8	.001	79.1	55.8	.000	60.7
No	48.8	39.5	21.2		20.9	44.2		39.3
Baseline smoking status								
Confirmed nonsmoker	64.5	54.0	42.4	.000	31.2	61.1	.000	54.9
Ambivalent nonsmoker	24.0	21.1	15.2		18.3	21.7		21.0
Early experimenter	11.6	24.9	42.4		50.5	17.2		24.1
Rebelliousness								
Low	66.7	47.4	27.7	.000	32.1	53.8	.000	49.3
High	33.3	52.6	72.3		67.9	46.2		50.7
Depression								
Low	47.0	41.2	36.9	.285	36.1	43.6	.378	42.0
Medium	32.5	31.2	27.7		34.3	30.2		31.0
High	20.5	27.6	35.4		29.6	26.3		27.0

^aCohort includes adolescents who at baseline had smoked no more than 1 cigarette in their lifetime.

^bProbability listed is for the χ^2 statistic.

Table 2 presents the results of a multiple logistic regression that examined the effect of receptivity while controlling for family and peer smoking, baseline smoking status, and rebelliousness—the variables significantly related to both receptivity to tobacco marketing and progression to established smoking. This analysis found that adolescents who were highly receptive to marketing in 1993 were more than twice as likely to become an established smoker by 1997 compared with those who had low receptivity (OR = 2.70, 95% confidence interval [CI] = 1.24, 5.85). Being an early experimenter and having a close friend who smoked also were significant independent predictors of progression to established smoking.

To examine the effect of tobacco marketing on youths who had not engaged in any experimentation with tobacco, we repeated the analyses with only the 402

respondents who, at baseline, had never taken a puff of a cigarette. Among these neversmokers, the rate of progression to established smoking was 29% for those who had high receptivity to tobacco marketing at baseline. The rates of smoking initiation among those who had moderate and low receptivity were 12% and 11%, respectively ($\chi^2_2 = 8.38, P < .02$).

We used the same multiple logistic regression model described above but substituted a 2-level indicator of susceptibility to smoking for the 3-level baseline smoking status; the magnitude of the effect of receptivity to tobacco marketing was essentially unchanged. The adjusted odds ratio for youths with high receptivity in relation to those with low receptivity was 2.32. However, the 95% confidence interval for the odds ratio included 1, most likely a result of lower statistical power because of the reduced sample size.

Discussion

To the best of our knowledge, this is only the second longitudinal study in the United States to examine the effect of tobacco advertising and promotional activities on smoking among a cohort of adolescents and the only longitudinal study to quantify the effect on progression from nonsmoking or early experimentation to established smoking. We found that attending to cigarette advertising and becoming involved in tobacco product promotions by obtaining an item of clothing, a sports bag, or some other piece of gear with a cigarette brand logo on it precede, and reliably predict, progression to established smoking, even when other factors that influence both smoking initiation and receptivity to marketing are controlled for. Thus, even though the group of youths who were highly receptive to tobacco marketing at baseline were more likely to be rebellious, to have experimented with ciga-

TABLE 2—Progression to Established Smoking Over 4 Years Among Cohorts^a of Massachusetts Adolescents, by Ownership of a Tobacco Promotional Item, With Control for Significant Demographic and Psychosocial Factors

	Adjusted ^b Odds Ratio	95% Confidence Interval
Receptivity to tobacco marketing		
High	2.70	1.24, 5.85
Moderate	0.98	0.53, 1.83
Low	1.00	...
At least 1 adult smoker in household		
Yes	1.52	0.95, 2.42
No	1.00	...
At least 1 close friend who smokes		
Yes	1.80	1.03, 3.14
No	1.00	...
Baseline smoking status		
Early experimenter	3.82	2.19, 6.69
Ambivalent nonsmoker	1.48	0.79, 2.80
Confirmed nonsmoker	1.00	...
Rebelliousness		
High	1.29	0.77, 2.16
Low	1.00	...

^aCohort includes adolescents who at baseline had smoked no more than 1 cigarette in their lifetime.

^bAdjusted odds ratios were derived from analyses in which all other listed variables were included in the model.

rettes, and to have been exposed to parental or peer smoking, these differences do not fully account for the observed differences in progression to established smoking.

The observed finding also cannot be explained by differential loss to follow-up. Among respondents who were lost to follow-up, those who owned a promotional item also scored higher on the covariates related to subsequent smoking. Had we been successful in interviewing the entire sample, we would most likely have found an even greater disparity in the proportion of established smokers between those with high and those with low receptivity, even if receptivity had no independent effect. Hence, if anything, our estimate of the effect of tobacco marketing activities is conservative.

This study found that the associations detected in prior studies were not solely a result of increased participation in tobacco promotions among youths who have already moved along the smoking initiation continuum. Also, our findings support those of Pierce et al.,⁴⁷ who found that among non-smoking California adolescents who were not susceptible to smoking at baseline, the risk of progression to established smoking over a 3-year follow-up period was about 3 times higher for those who owned or were willing to use a tobacco promotional item at baseline. The fact that this outcome has been observed in the first 2 states to conduct population-based, longitudinal studies that exam-

ined factors associated with smoking initiation broadens the generalizability of the findings in both studies.

It is important to point out that we do not attribute the effect of tobacco marketing observed in this study to merely seeing cigarette advertisements and coming into possession of a tobacco promotional item. A better explanation of the process is that promotional items and the images they have come to represent through advertising campaigns are particularly attractive to adolescents who, for some reason, are looking for an identity that the images are carefully designed to offer. These are the youths who would retain the items, whereas those whose identity needs are met in other ways would likely lose, discard, or forget about the items. Having the items offers to the vulnerable group the opportunity to “try on the image of a smoker.”^{23(p124)} Doing so is likely part of a longer-term process of accepting the image and eventually the smoking behavior associated with it.

The Multistate Master Settlement Agreement with the major tobacco companies includes some restrictions on billboard and transit advertisements and some forms of promotional items.⁵⁵ However, tobacco advertising images will still be widely displayed inside and outside of stores, in magazines, in entertainment sections of newspapers, and at local sponsored events. Because these images hold the power to influence adolescent behavior, a

more comprehensive restriction on image advertising is warranted. □

Contributors

L. Biener designed the baseline survey, oversaw the data collection, and analyzed the data. L. Biener and M. Siegel codedigned the follow-up survey and cowrote the paper.

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