

THE EFFECT OF ENFORCING TOBACCO-SALES LAWS ON ADOLESCENTS' ACCESS TO TOBACCO AND SMOKING BEHAVIOR

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**ABSTRACT**

*Background* Enforcing laws banning tobacco sales to minors is widely advocated as a way to reduce young people's access to tobacco and tobacco use. Whether this approach is successful is not known.

*Methods* In a two-year controlled study, we assessed sales of tobacco to minors and young people's access to and use of tobacco in six Massachusetts communities. Three communities (the intervention group) enforced tobacco-sales laws, whereas three matched communities (the control group) did not. To assess compliance with the law, minors working for the study investigators attempted to purchase tobacco from all retail vendors in each community every six months. Three annual anonymous surveys of a total of 22,021 students in grades 9 through 12 (response rate, 84 percent) measured access to tobacco and smoking behavior.

*Results* At base line, 68 percent of 487 vendors sold tobacco to minors. Compliance with the law improved significantly faster in the intervention communities than in the controls ( $P < 0.001$ ). By the study's end, 82 percent of the merchants in the intervention communities complied with the law, as compared with 45 percent in the control communities ( $P < 0.001$ ). However, adolescents under 18 years old reported only a small drop in their ability to purchase tobacco and no decline in its use. Communities with and those without enforcement programs did not differ with respect to these outcomes.

*Conclusions* Enforcing tobacco-sales laws improved merchants' compliance and reduced illegal sales to minors but did not alter adolescents' perceived access to tobacco or their smoking. Test purchases of tobacco do not accurately reflect adolescents' self-reported access to tobacco, and reducing illegal sales to less than 20 percent of attempts — the goal of a new federal law — may not decrease young people's access to or use of tobacco. (N Engl J Med 1997;337:1044-51.)

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**P**REVENTING people from beginning to smoke is a major public health priority.<sup>1-3</sup> Efforts must focus on the young, because 88 percent of smokers start by the age of 18<sup>3</sup> and smoking is increasing among adolescents.<sup>4,5</sup> Reducing young people's access to tobacco is proposed as one way to decrease their use of tobacco.<sup>6,7</sup> Policies with this goal are widely advocated and have strong public support,<sup>8</sup> but their effectiveness in deterring smoking is unknown. Nonetheless, many state and local governments, and now the federal government, are attempting to reduce access to tobacco among minors.<sup>6,7,9</sup> Beginning on February 28, 1997, the Food and Drug Administration (FDA) established 18 as the national minimum age at which tobacco could be sold and required vendors to verify purchasers' ages.<sup>10</sup> New regulations of the Department of Health and Human Services require that states demonstrate progress in reducing sales of tobacco to minors in order to receive block-grant funding to combat substance abuse.<sup>11</sup>

All 50 states already prohibit tobacco sales to minors, but they rarely enforce the laws.<sup>12</sup> Tobacco retailers frequently sell to minors,<sup>3,13-18</sup> and stores and vending machines are the primary sources of tobacco for adolescents.<sup>13,19-22</sup> Improving compliance with tobacco-sales laws can potentially reduce the availability of tobacco to young people and thus discourage them from smoking. Educating vendors about the laws has not brought sustained improvement in compliance.<sup>23-25</sup> Active enforcement of tobacco-sales laws is now widely advocated. This approach entails having minors periodically try to purchase tobacco and fining merchants who violate the law. Enforcement has reduced sales to minors,<sup>6,7,26-28</sup> but there are limited data on its effectiveness in limiting adolescents' access to tobacco or their smoking. In two uncontrolled studies conducted in single communi-

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ties, teenage smoking was reduced when enforcement programs achieved compliance rates greater than 90 percent (that is, when more than 90 percent of minors' attempts to purchase tobacco failed).<sup>6,7</sup> However, without data from control communities the decline in tobacco use cannot be attributed unequivocally to enforcement.

We sought to determine in a controlled study whether enforcing a tobacco-sales law reduced the proportion of stores selling tobacco to minors and consequently limited adolescents' access to and use of tobacco. We hypothesized that if a level of compliance similar to the 90 percent rate reached in the earlier studies could be achieved, adolescents would report more difficulty obtaining tobacco and less smoking.

## METHODS

### Study Design

We tested the effect of enforcing tobacco-sales laws in six Massachusetts communities. The study design called for three communities to implement enforcement programs over a two-year period, while three matched control communities did not. Outcome measures — tobacco sales to minors and adolescents' access to tobacco and smoking behavior — were assessed before and after the intervention.

### Selection of Communities

Massachusetts law prohibits the sale of tobacco products to people under the age of 18. Local health departments can enact additional tobacco-sales regulations and enforce state and local restrictions. The intervention sites were three communities in metropolitan Boston that had recently enacted similar tobacco-sales regulations and planned to enforce them actively, but had not yet done so. Each was matched according to population size and median household income with a control community that was not currently enforcing the tobacco-sales laws and had no plans to do so. The control and the intervention communities were separated geographically but were well matched with respect to sociodemographic factors (Table 1). During the study period, all six local health departments received funds from the Massachusetts Tobacco Control Program on a per capita basis for the development and implementation of tobacco policy.

### Measures

#### Tobacco Sales to Minors

Merchants' compliance with tobacco-sales laws was monitored in all six communities at base line (February through April 1994) and every six months thereafter for two years. Minors, supervised by adult study personnel, attempted to purchase tobacco at every retail tobacco outlet in each community. We used girls 16 years old (20 in all) in the compliance checks to minimize variability in measurement due to the buyer's age and sex.<sup>15,23,24</sup>

In each store, the girl asked a clerk for a pack of cigarettes. If asked, she stated her true age but showed no proof of age. If there were vending machines, she attempted to purchase cigarettes directly from them, asking a clerk to unlock any vending machine that had a locking device. After each attempt to buy tobacco, study personnel recorded data on the type of store, the type of sale (over the counter or from a vending machine), the results of the purchase attempt, and whether the minor was asked for proof of her age. These data were kept confidential and were not used for enforcement purposes. We identified the vendors from lists of tobacco licensees kept by the health department. In communities

TABLE 1. CHARACTERISTICS OF THE STUDY COMMUNITIES.

COMMUNITY	POPULATION, 1990	MEDIAN HOUSEHOLD INCOME, 1990	HIGH-SCHOOL ENROLLMENT, 1993-1994*
	no.	dollars	no. of students
Pair 1			
Intervention	76,210	32,455	1896
Control	84,985	35,858	2417
Pair 2			
Intervention	54,718	45,598	1651
Control	44,630	43,309	1664
Pair 3			
Intervention	27,557	60,357	1179
Control	20,267	65,994	808

\*These figures include students enrolled in grades 9 through 12 in all public and private high schools in the community.

that lacked such information, we identified the tobacco vendors by screening all establishments that had retail food or food-service licenses and all liquor stores, gas stations, and recreational facilities.

#### Access to Tobacco and Smoking Behavior

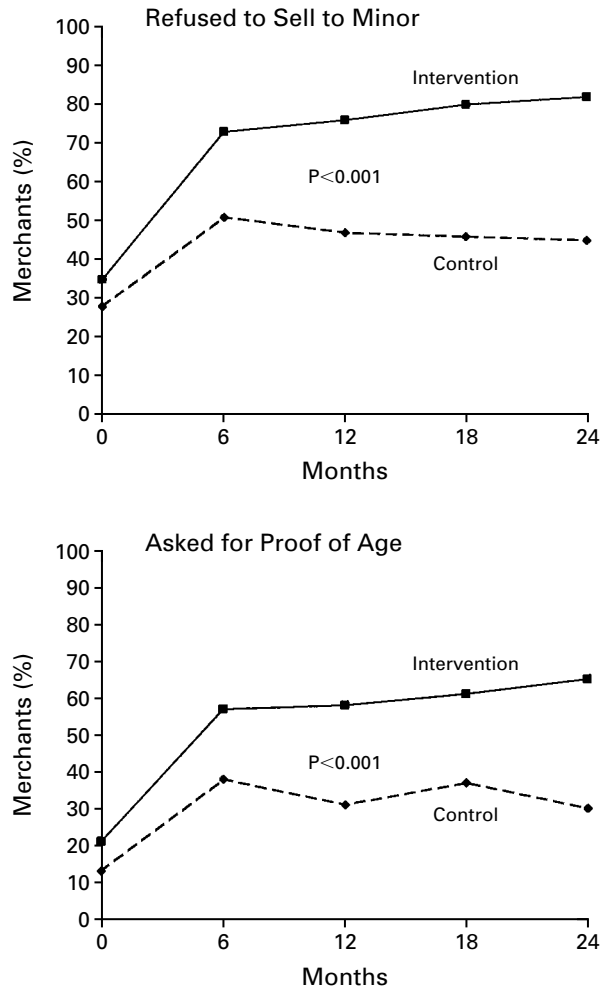
Students in grades 9 through 12 in all the public and private high schools in the six communities were given anonymous, self-administered surveys at base line (from December 1993 through February 1994) and annually for two additional years. Passive parental consent for the study was obtained (that is, the parents returned a form only if they did not want their child to participate).<sup>29</sup> The 33-item survey instrument assessed sociodemographic factors (age, sex, ethnic group, grade in school, and city of residence), past and present tobacco use, and the source of any tobacco products obtained. Items eliciting data on smoking behavior were adapted from previous surveys.<sup>30-32</sup> The students' use of cigarettes and smokeless tobacco was assessed with parallel questions. The students were asked if they had purchased tobacco in the past 30 days and if so, how they had mainly obtained it. The degree of access to tobacco was measured by asking respondents who had tried to buy tobacco in the past six months how often they had been refused it.

#### Intervention

After the base-line collection of data, all six local health departments distributed written information about the tobacco-sales laws to the retailers. The health departments in the intervention communities then began testing vendors regularly for compliance and penalizing violators with an escalating series of warnings and fines. These compliance checks done for purposes of enforcement were separate from those conducted by members of the research staff to assess outcomes. On the basis of experience in other communities,<sup>6,7</sup> the goal was a compliance rate among merchants of more than 90 percent. The intervention communities were encouraged to test all merchants four times a year (a total of eight tests) and to test noncompliant merchants more often. The control towns were contacted annually in order to monitor their regulations and any enforcement activity.

#### Statistical Analysis

The intervention and control communities were compared in matched pairs. Each pair was considered first separately and then together with the other pairs. We examined changes in end points over time in each community and then compared the matched communities at each point and over time. Multiple logistic-regression



**Figure 1.** Merchants' Compliance with the Tobacco-Sales Law. The upper panel shows the proportion of merchants who refused to sell tobacco to a minor. The lower panel shows the proportion of merchants who asked youths for proof of age. Over the two years of the study, both measures of compliance increased more rapidly in the intervention group than in the controls ( $P < 0.001$ ), according to a mixed-effects model. Compliance was significantly higher ( $P < 0.001$ ) in the intervention group at each observation after base line.

analysis was used to examine the differences between communities at each assessment. Changes over time in end points were examined in mixed-effects models.<sup>33</sup> Two-tailed  $P$  values of less than 0.05 were considered to indicate statistical significance.

The main outcome for the sales of tobacco was the rate of compliance by merchants, which was defined as the proportion of tobacco vendors who refused to sell tobacco to minors. Vending-machine sales and over-the-counter sales were analyzed both together and separately. The list of identified vendors changed over time, but there was considerable overlap from each time point to the next. Therefore, the data were analyzed with a mixed-effects model in which the covariates that were related to the outcome measure (study group, time point, type of sale, and store type) were included as fixed effects and the individual store was included as a random effect. The term for the interaction of group with

time was interpreted as the difference in the rate of change between the intervention and the control communities. The rate of enforcement was calculated for each community by dividing the number of tests of compliance performed for enforcement purposes by the number of tobacco vendors at the midpoint of the study period.

In the analysis of the school surveys, data from respondents 18 or more years old (to whom tobacco could be sold legally) were excluded, as were data from respondents who did not live in the city or town where they attended school. Cigarette smoking and the use of smokeless tobacco were analyzed separately, and the data were then combined. The primary end point was the prevalence of current tobacco use, defined as the smoking of a cigarette or the use of smokeless tobacco within the past 30 days. The secondary end points were the prevalence of any past use of tobacco (a puff on a cigarette or the use of smokeless tobacco) and the prevalence of regular use (daily cigarette smoking or daily use of smokeless tobacco for the past 30 days). The study design was cross-sectional because the surveys were anonymous, but substantial overlap in the pool of respondents over time was expected. Therefore, the data were analyzed with a mixed-effects model. Study group, time point, age, sex, and ethnic group were included as fixed effects, and the school attended was included as a random effect, to account for any correlation among the students at each school. The responses were studied in aggregate and then stratified according to age, sex, and ethnic group.

## RESULTS

### Enforcement of Tobacco-Sales Laws

The health departments in the three intervention communities instituted compliance testing as planned. The tobacco vendors were tested in April and May 1994, and violators received warnings. Fines of \$20 to \$200 were issued for subsequent violations, beginning one, two, and eight months after the start of the intervention period. The intervention communities conducted a total of 966 compliance tests (4.3 tests per vendor) over the two-year period — fewer than the 8 tests per vendor specified in the study protocol. Forty-six fines were paid. No license to sell tobacco was suspended.

None of the control communities conducted compliance tests or enforcement before the study began. During the study, all three control communities adopted tobacco-sales regulations similar to those in the intervention communities and began checking compliance, completing 111 tests (0.5 test per vendor) over the two-year period. Two towns began enforcement, and fines began to be issued 10 and 13 months after the study started. Five fines were paid. Nonetheless, the intervention communities conducted far more enforcement than the controls throughout the study. They initiated compliance testing earlier, conducted more tests per vendor, and issued fines earlier and in greater numbers. All the communities educated their merchants through mailings, retailer training, and publicity during the study.

### Tobacco Sales to Minors

Five rounds of compliance checks were conducted for research purposes. At base line, of 487 vendors tested (375 stores and 112 vending machines), 68

percent sold tobacco to a minor, a compliance rate of 32 percent. The base-line rates did not differ significantly between the communities in each pair or between the intervention and the control groups overall (35 percent and 28 percent, respectively;  $P=0.22$ ). During the study period, compliance increased among the merchants in all the communities, but it increased more rapidly in the intervention group than in the control group according to a mixed-effects model with adjustment for time point, type of store, and type of sale (Fig. 1, upper panel). The difference was also statistically significant ( $P<0.001$ ) for two of the three pairs of communities (data not shown). Compliance was significantly better ( $P<0.001$ ) in the intervention communities than in the controls at each follow-up point; by the end of the study, the rates were 82 percent and 45 percent, respectively ( $P<0.001$ ). The proportion of minors who were asked to show proof of their age also increased over time (Fig. 1, lower panel). The mixed-effects model demonstrated that the rate at which such proof was requested rose more rapidly in the intervention group than in the controls ( $P<0.001$ ). By the end of the study, these requests were made during 65 percent of purchase attempts in the intervention communities, as compared with 30 percent of attempts in the control communities ( $P<0.001$ ). In both groups, most of these changes took place during the first six months, reflecting the education of merchants in all the cities and towns and the marginal benefit of enforcement in the intervention communities. There was gradual improvement with continuing enforcement in the intervention communities, but not with education in the control communities.

Thus, enforcement improved compliance with the law, but compliance in the intervention group overall never reached the study goal of 90 percent. These results were unchanged when the analyses were limited to over-the-counter sales; the sample was too small for a separate analysis of vending-machine sales.

#### Surveys of High-School Students

Three annual surveys were conducted in all 10 high schools in the six study communities. The student enrollment for the three years combined was 29,139, of whom 26,168 (90 percent) were in school on the survey days (Table 2). The parents of 0.4 percent of the students refused consent for the study. A total of 22,021 surveys were returned (response rate, 84 percent). We excluded the responses from 2816 students who did not live in the city or town where they attended school (13 percent) and from 1602 students 18 or more years old (7 percent), which left 17,603 surveys for analysis. The students in the intervention group (8702 students) and the control group (8901 students) did not differ in age (range, 13 to 17 years) or sex (52 percent were female). The control group included more whites

TABLE 2. CHARACTERISTICS OF THE HIGH-SCHOOL SURVEYS.

YEAR	STUDENT ENROLLMENT	STUDENTS PRESENT ON SURVEY DAY	USABLE SURVEYS	MEAN RESPONSE RATE (RANGE)*
	no.	no. (%)	no.	%
Base line (1993–1994)	9,615	8,625 (90)	7,112	82 (71–95)
Year 1 (1994–1995)	9,703	8,678 (89)	7,310	84 (70–100)
Year 2 (1995–1996)	9,821	8,865 (90)	7,599	86 (80–97)
All years	29,139	26,168 (90)	22,021	84
Intervention	14,282	13,096 (92)	10,581	81
Control	14,857	13,072 (88)	11,440	88

\*Response rates equal the number of usable surveys divided by the number of students present on the survey day. Ranges refer to the response rates among the 10 schools studied.

than the intervention group (79 percent vs. 74 percent,  $P=0.001$ ).

#### Access to Tobacco

The primary measure of access was the difficulty young people had in buying cigarettes, as reported by those who had tried to purchase tobacco in the previous six months. At base line, 76 percent of respondents in the intervention group and 78 percent of those in the control group said that vendors hardly ever refused to sell them tobacco (Table 3). These proportions decreased in both groups during the study. There was a corresponding increase in the proportion of students who were refused tobacco at least half the time they attempted to buy it. However, the control and intervention groups did not differ in the rate at which either measure changed, according to a mixed-effects model that adjusted for age, sex, ethnic group, study group, and study year. Two other measures of access to tobacco, the proportion of respondents who had recently either purchased tobacco or tried to do so, decreased no more rapidly in the intervention group than in the control group (Table 3). In short, the decline in access to tobacco reported by the youths could not be attributed to enforcement of the tobacco-sales laws.

The respondents who had smoked in the past 30 days were asked how they had obtained most of their tobacco. We expected that they would shift to alternative means of procurement if their commercial access to tobacco was restricted. In the six communities overall, the proportion of youths who bought most of their tobacco in their own city or town fell from 51 percent to 40 percent over the study period ( $P<0.001$ ). There were corresponding increases in the proportions who purchased tobacco in other communities (from 5 percent to 8 percent,  $P=0.002$ ) or had someone buy it for them (from

**TABLE 3.** ACCESS TO TOBACCO AS REPORTED BY THE YOUTHS SURVEYED.

MEASURE	STUDY GROUP	BASE LINE	YEAR 1	YEAR 2	P VALUE	
					TREND WITHIN GROUP*	COMPARISON BETWEEN GROUPS†
% of respondents						
Bought tobacco within past 30 days	Control	21‡	20‡	19‡	0.04	0.11
	Intervention	15	13	15	0.78	
Tried to buy tobacco within past 6 mo	Control	36‡	31‡	29‡	<0.001	0.44
	Intervention	29	23	24	<0.001	
Ease of purchase§ Hardly ever refused	Control	78‡	69‡	63‡	<0.001	0.99
	Intervention	76	62	58	0.02	
Refused at least half the time	Control	12	19	23	<0.001	0.09
	Intervention	13	23	28	<0.001	

\*Values represent the statistical significance of the trend over time in the group shown and are derived by multiple logistic regression with adjustment for age, sex, and ethnic group.

†Values represent the statistical significance of the difference between the two study groups in the rates of change in a mixed-effects model with adjustment for age, sex, ethnic group, study group, and study year.

‡P<0.001 for the comparison with the intervention group by multiple logistic regression, with adjustment for age, sex, and ethnic group.

§Data shown were collected among respondents who had tried to buy tobacco in the previous six months.

7 percent to 16 percent,  $P<0.001$ ). These increases occurred at similar rates in the intervention and control communities, indicating that they could not be attributed to enforcement (Fig. 2).

**Smoking**

Table 4 shows the rates of tobacco use reported by adolescents. The rates at base line and each year of follow-up were higher in the control group than in the intervention group. The prevalence of any use of tobacco and of daily tobacco use did not change at different rates in the two groups, according to a mixed-effects model that adjusted for respondents' age, sex, ethnic group, study group, and study year (Table 4). The rate of current tobacco use rose in the intervention communities but remained stable in controls, the reverse of what would have been expected; however, this difference was of borderline significance ( $P=0.05$ ). When we repeated the analysis with the respondents stratified according to age, sex, and ethnic group, there was no significant difference in any subgroup, including the youngest one (respondents 13 and 14 years of age), in which the effect of the intervention was expected to be greatest. The results were unchanged when we limited tobacco use to cigarettes. The use of smokeless tobacco was low and declined similarly in both groups. In sum, there were no meaningful differences between the intervention group and the control group in the rate at which tobacco use changed during the study period.

**DISCUSSION**

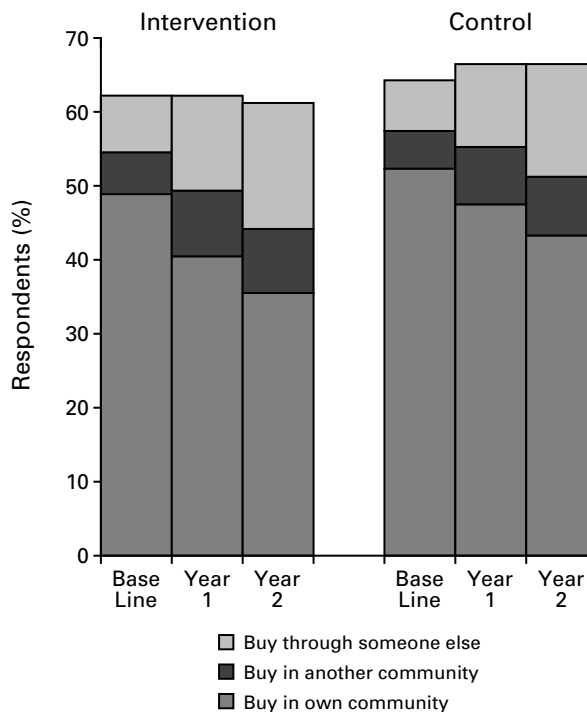
This controlled study in six communities tested the efficacy of law enforcement in reducing young people's access to tobacco and their smoking. We found that enforcing a tobacco-sales law for two years improved merchants' compliance and reduced the sales of cigarettes to minors under our test conditions. Despite the dramatic and sustained increase in compliance by merchants, young people reported little decline in their ability to buy tobacco products. There was no greater decline in communities that had enforcement programs than in those that did not. Hence, even the small decrease in adolescents' perceived access to tobacco was not attributable to law enforcement. Because the intervention did not reduce high-school students' self-reported access to tobacco, it is not surprising that it did not alter their smoking behavior.

Reducing young people's access to tobacco has become a cornerstone of public policy regarding tobacco control in this decade. A growing number of federal, state, and local laws and regulations are intended to accomplish this goal.<sup>9-11</sup> This activity has occurred in the absence of evidence clearly supporting its efficacy, and therefore there has been debate in the public health community about the wisdom of the current focus on reducing access.<sup>34</sup> Empirical demonstration of benefit is critical to justify the resources being expended on this new effort. We addressed this important question.

This study documents a previously unreported dis-

crepancy between young people's reports about their access to tobacco and the results of compliance tests that are thought to measure access. We intentionally used only 16-year-old girls to measure tobacco sales to minors, because merchants are more likely to sell tobacco to girls and to older adolescents.<sup>15,23,24</sup> Nonetheless, even with these stringent, standardized tests of compliance, the test results appear to overestimate the difficulty experienced by young people trying to buy tobacco. By the end of the study, 16-year-old girls participating in compliance checks could buy tobacco in only 18 percent of stores in communities with enforcement programs, yet 53 percent of 16-year-olds living in the same communities reported that they hardly ever failed to buy tobacco when they tried to do so, and 70 percent succeeded most of the time. Young people may exaggerate their ability to purchase tobacco, but it is unlikely that overstatement alone explains the discrepancy.

Our findings suggest that tests of compliance, as they are typically conducted, underestimate young people's access to tobacco. There are several potential explanations for this. Underage youths who try to buy tobacco probably behave differently than do youths in compliance checks. For example, they may lie about their age, use false identification, dress to appear older, cajole a clerk into making a sale, or enlist an older teenager or adult to buy for them. It is also possible that store owners who are aware of the possibility of compliance checks will sell tobacco only to youths with whom they are familiar. Health officials in the communities we studied reported such occurrences. Young people may also buy tobacco in neighboring towns that lack similar enforce-



**Figure 2.** Smokers' Chief Means of Obtaining Tobacco.

The chief means of obtaining tobacco in the 30 days before each survey, as reported by the current smokers, shifted over the 2-year study period. Declining proportions of the young people who smoked bought most of their tobacco in their own community, whereas the proportions who bought most of their tobacco in another community or had someone else buy it for them increased. The proportion who obtained their tobacco from friends or household members, which accounts for the remaining current smokers and is not shown, did not change. The rates of change were similar in the two study groups.

**TABLE 4.** TOBACCO USE AMONG ADOLESCENTS.\*

MEASURE OF USE	STUDY GROUP	BASE LINE	YEAR 1	YEAR 2	P VALUE	
					TREND WITHIN GROUP†	COMPARISON BETWEEN GROUPS‡
% of respondents						
Use at any time	Control	64.5§	62.7§	62.7§	0.15	0.28
	Intervention	56.1	53.9	55.5	0.97	
Current use	Control	29.8§	30.1§	30.0§	0.93	0.05
	Intervention	22.5	23.5	25.3	0.01	
Daily use	Control	16.8§	16.0§	16.4§	0.57	0.08
	Intervention	10.7	11.4	13.2	0.14	

\*Data are for the use of cigarettes or smokeless tobacco. Data on current use and daily use refer to the 30-day period preceding the completion of the survey questionnaire.

†Values represent the statistical significance of the trend over time in the group shown and are derived by multiple logistic regression with adjustment for age, sex, and ethnic group.

‡Values represent the statistical significance of the difference between the two study groups in the rates of change in a mixed-effects model with adjustment for age, sex, ethnic group, study group, and study year.

§P<0.01 for the comparison with the intervention group by multiple logistic regression, with adjustment for age, sex, and ethnic group.

ment. Furthermore, even if compliance checks assessed the behavior of any one vendor accurately, the rate of compliance by merchants might not reflect actual access to tobacco. Even if only one store in a community sells tobacco to minors, young people who know about it could obtain tobacco easily.

We found no meaningful difference in smoking behavior between communities that implemented enforcement programs and those that did not. This cannot be interpreted as evidence that enforcing tobacco-sales laws does not alter young people's smoking behavior, because enforcement also failed to reduce young people's self-reported access to tobacco. Instead, this study shows that enforcement that did not reduce young people's access to tobacco substantially did not affect their smoking behavior. The results of this study differ from those of two previous uncontrolled studies, which found that enforcing tobacco-sales laws reduced youths' smoking.<sup>6,7</sup> In Woodridge, Illinois, and Leominster, Massachusetts, smoking among junior-high-school students dropped by 69 and 44 percent, respectively, over a period of two years. In both studies rates of compliance by merchants that exceeded 90 percent were achieved and sustained. Presumably, young people's access to tobacco was also reduced, although that variable was not measured. In contrast, the communities in our intervention group achieved 82 percent compliance by the end of the study, a rate that proved insufficient to reduce access. In Woodridge, a law prohibiting the possession of tobacco by minors was enforced simultaneously and may have contributed to the reduction in smoking among young people.<sup>35</sup> Both studies included junior-high-school students, whom we did not study. We cannot be sure that in our study enforcement did not affect tobacco use among young people who were not yet teenagers, but it did not affect smoking in our youngest age group (those 13 and 14 years old).

This study is limited in that we could not randomly select the communities in the intervention group. Another limitation, inherent in community trials, is that the investigators did not fully control exposure to the intervention. Implementing vigorous enforcement programs was challenging for the directors of the health departments in the intervention communities, despite committed leadership, the presence of local regulations, and funds provided by the state for enforcement. Political, bureaucratic, legal, and logistic obstacles, including pressure from tobacco retailers, prevented the health departments from testing compliance as frequently as was planned and from imposing penalties as aggressively as was intended. Consequently, merchants' compliance never reached the level specified by the study design. The fact that enforcement was begun in two control communities was another factor beyond our control, one that potentially threatened our ability to measure an effect

of intervention. However, enforcement began later in those control communities and was far weaker than in the intervention communities. The fact that merchant compliance differed significantly between the control and the intervention groups throughout the study implies that enforcement also differed, thereby permitting a controlled test of the effects of enforcement.

In conclusion, our findings suggest caution with regard to the escalating efforts to reduce access to tobacco by young people. Law enforcement that appeared to substantially improve merchants' compliance with a tobacco-sales law failed to produce corresponding reductions in young people's self-reported access to tobacco from commercial sources or to alter their smoking behavior. Compliance checks used to monitor law enforcement did not reflect young people's access to tobacco, as policy makers, public health officials, and tobacco control advocates have generally assumed they do. Our findings suggest that reducing young people's access to tobacco will require even better merchant compliance than the 82 percent rate achieved here. This arouses concern about the likely effect of new federal regulations intended to reduce teenage smoking by reducing the supply of tobacco to minors.<sup>10,11</sup> Federal law now requires the Department of Health and Human Services to withhold block grants from states that fail to "enforce their laws in a manner that can reasonably be expected to reduce the extent to which tobacco products are available to individuals under the age of 18."<sup>11</sup> The department has suggested that it will require states to achieve compliance rates of 80 percent.<sup>36</sup> Our study suggests that even if states meet that goal, the law cannot reasonably be expected to reduce the supply of tobacco to young people or alter their smoking behavior. New FDA regulations<sup>10</sup> set a national standard for tobacco sales to minors, but careful monitoring of compliance with the regulations is likely to be needed if they are to affect tobacco use nationwide.

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