

Youth Access to Tobacco: The Effects of Age, Gender, Vending Machine Locks, and "It's the Law" Programs

ABSTRACT

Objectives. This study evaluated the influence of age, gender, vending machine lockout devices, and tobacco industry-sponsored voluntary compliance programs ("It's the Law" programs) on underage youths' ability to purchase tobacco.

Methods. Twelve youths made 480 attempts to purchase tobacco in Massachusetts from over-the-counter retailers and vending machines with and without remote control lockout devices. Half the vendors were participating in It's the Law programs.

Results. In communities with no requirements for lockout devices, illegal sales were far more likely from vending machines than from over-the-counter sources (odds ratio [OR] = 5.9, 95% confidence interval [CI] = 3.3, 10.3). Locks on vending machines made them equivalent to over-the-counter sources in terms of illegal sales to youths. Vendors participating in It's the Law programs were as likely to make illegal sales as nonparticipants (OR = 0.87, 95% CI = 0.57, 1.35). Girls and youths 16 years of age and older were more successful at purchasing tobacco.

Conclusions. The It's the Law programs are ineffective in preventing illegal sales. While locks made vending machines equivalent to over-the-counter sources in their compliance with the law, they are not a substitute for law enforcement. (*Am J Public Health*. 1996;86:221-224)

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Introduction

The Tobacco Institute, Philip Morris, and the RJ Reynolds Tobacco Company each sponsor programs with the stated purpose of encouraging merchant compliance with laws prohibiting the sale of tobacco to minors.¹ Each of these programs involves the distribution of educational materials and window stickers to merchants. Stickers displayed on store windows and vending machines identify participating merchants. The differences among these programs are minor, and they are referred to collectively here as "It's the Law" programs.

The only previous evaluation of the effectiveness of the It's the Law programs was conducted in Massachusetts in 1991. Only 7 of the 156 retailers visited were participating in these programs (4.5%). Of these 7 participating merchants, 6 were willing to sell tobacco to a minor (86%), in comparison with 88% of the 149 who were not participating.² The current study sought to reevaluate these programs using a larger sample.

Youths have consistently had more success purchasing cigarettes from vending machines than from over-the-counter sources.³⁻⁷ Many communities have responded by banning cigarette vending machines.⁸ Vending machine owners have proposed electronic remote control lockout devices as an alternative to a ban. These devices render machines inoperable until activated by the management, making vending machines equivalent, in theory, to over-the-counter sources by requiring human interaction.

Only one study has evaluated the effectiveness of lockout devices in preventing illegal sales.⁹ Three months after a local law requiring lockout devices on all machines went into force, a minor was able to purchase tobacco from 19% of

vending machines equipped with locks, in comparison with 65% of machines without locks. One year later in the same community, minors were able to purchase from 39% of machines with locks as compared with 91% of those without locks. The current study compared the availability of cigarettes from over-the-counter sources and from vending machines with and without lockout devices to determine whether these devices are effective in preventing illegal sales.

Federal law now requires each state to effectively enforce a prohibition on the sale of tobacco to minors under the age of 18 years.¹⁰ Proposed Department of Health and Human Services regulations require states to demonstrate effective enforcement of the law by annual assessments of the availability of tobacco through attempted purchases by underage youths.¹⁰ However, comparisons of survey results from various states may not be valid if youths of different ages or gender are involved.

Several authors report that girls have less difficulty buying tobacco than do boys.^{3,4,6,11} Others have not found gender differences^{12,13} or have found girls to be more successful in some comparisons but not others.^{5,14,15} Most of these studies have not controlled for the effects of age.^{3,11,14,15} As youths grow older, it becomes progressively easier for them to buy tobacco.^{3,4,6,16} The current study was designed to assess the independent and

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combined effects of age and gender on the ability to purchase tobacco.

Methods

A total of 480 attempts to purchase cigarettes were planned to assess the effects of age and gender on youths' ability to purchase tobacco and to assess youths' ability to purchase tobacco from vending machines vs over-the-counter outlets, from vending machines with and without lockout devices, and from retailers who were or were not participating in It's the Law programs. The study was conducted in Massachusetts, where it is not illegal for minors to purchase or possess tobacco, but it is illegal to sell tobacco to anyone under 18 years of age.

One boy and one girl 12, 13, 14, 15, 16, and 17 years of age were recruited through acquaintances to attempt to purchase tobacco. Parental and youth consent were obtained. All of the youths were nonsmokers at the time of the study, but past history of purchasing tobacco was not obtained.

Youths were individually trained according to a standard protocol. They were instructed not to attempt to look older. If tobacco was sold over the counter, the youth was instructed to ask the clerk for a pack of cigarettes. If asked, the youths were instructed to state their true age and to state that the cigarettes were for their own use. If requested, the youths were instructed to present proof of age, if they had it, or to state that they did not have proof of age. No attempt was made to cajole the clerk into selling. In the case of vending machines without locking devices, the youths were instructed to walk up to the machine and attempt to make a purchase. If the vending machine was locked, the youth was instructed to ask an employee to unlock the machine.

The youths were escorted from business to business by a research assistant who remained out of sight in the car. After the attempted purchase, the youth returned to the car to report what had happened. A record was made of the name of the business, age and gender of the youth, whether a sale was made, and whether proof of age was requested. The youths and the research assistant were unaware of the purpose of the study.

In Massachusetts, vending machine lockout devices are found only where they are required by local laws. All communities with such a requirement were identified and explored to locate locked machines. Lists of tobacco licensees are not

available to the public, so randomization was not feasible.

An effort was made to locate 40 vending machines such that 10 had both lockout devices and It's the Law stickers, 10 had locks but no stickers, 10 had stickers but no locks, and 10 had neither locks nor stickers. An extensive search located only 7 machines with locks but no stickers, so an extra 3 machines with neither locks nor stickers were included.

Since the degree to which the law is enforced varies from city to city, each of the 40 vending machines was randomly matched to an over-the-counter outlet in the same community. Machines displaying It's the Law stickers were matched to over-the-counter sources that also displayed a sticker. Machines without stickers were matched to over-the-counter sources without stickers. All of the tobacco retailers were located in eight suburban and small urban communities. The over-the-counter vendors included convenience stores, pharmacies, liquor stores, and gasoline stations. All of the vending machines were located in restaurants.

The 12 youths were divided into two groups such that 1 youth of each age was assigned to each group; the youths 12, 14, and 16 years old were of one sex, and those 13, 15, and 17 years old were of the opposite sex. The 40 matched pairs of vendors were divided into two lists of 20 matched pairs (40 merchants) such that each list contained equal numbers of vending machines, over-the-counter vendors, and It's the Law participants. The two groups of 6 youths were then randomly paired to the two lists of 40 merchants.

Each youth made one attempt to purchase from each of the 40 merchants on his or her list. Each vendor was visited by three boys and three girls. Both members of a matched pair of merchants were visited by the same six youths. The purchasing was conducted from June to August of 1994, with purchase attempts from the same merchants separated by an average of 1 week. The youths participated in random order to avoid possible confounding by a learning effect on the part of merchants.

Photographs of the 12 youths were shown to 28 randomly selected high school employees who were asked to guess the youths' ages. The school personnel were told only that the most accurate respondent would win \$20. The arithmetic mean of these 28 guesses produced an apparent age for each youth.

Logistic regression analyses were performed with SAS for personal computers.¹⁷ In the main models, the completed purchase of tobacco was the dependent variable. Independent variables were the individual youths; the youths' gender, chronological age, and apparent age; installation of a vending machine lockout device; participation in It's the Law programs; type of retail outlet (i.e., vending machine vs over the counter); and whether or not the outlet was located in a community that required lockout devices on vending machines ("location"). In an additional model, requests for proof of age were examined as the dependent variable. The individual youths were used as independent variables to control for the repeated measures aspect of the study design. A *P* value of < .05 was used as a test of statistical significance. Ninety-five percent confidence intervals (CIs) are provided.

The study was approved by the University of Massachusetts Medical Center's Committee for the Protection of Human Subjects.

Results

The youths were successful in 33% of their attempts to purchase tobacco (Table 1). Of the six opportunities to sell, 28% of vendors never sold, 23% sold once, 16% sold twice, 9% sold three times, 13% sold four times, 6% sold five times, and 6% sold at every opportunity.

In the initial logistic regression analysis, each youth was treated as a separate independent variable. Three youths made significant contributions and were retained in the final models.

While the mean chronological age for the 12 youths was 14.5 years, the mean apparent age was 15 years. On average, girls appeared to be 1.1 years older than boys of the same chronological age. Although the outcomes of the analyses were nearly identical regardless of whether apparent or chronological age was used, the apparent age showed a more linear relation to the ability to purchase and was used in preference to chronological age in the final models.

The main model included gender, apparent age, type of retail outlet, location, and participation in It's the Law programs. Apparent age was a significant predictor of purchase success. Youths who appeared to be 16 and 17 years of age were much more successful than youths who appeared to be 11 to 15 years old (odds ratio [OR] = 3.4, 95% CI = 2.0,

5.8) ($P = .0001$). A bivariate analysis showed that girls had a greater purchase success rate (OR = 1.49, 95% CI = 1.01, 2.19, $P < .05$), and this persisted as a trend when apparent age was controlled in the regression analysis (OR = 1.59, 95% CI = 0.94, 2.7) ($P = .08$). There were no significant age-gender interactions.

Youths were much more successful at purchasing from vending machines than from over-the-counter sources (OR = 3.0, 95% CI = 1.9, 4.7) ($P = .0001$). The It's the Law programs were not associated with a significant reduction in illegal sales either when vending machines and over-the-counter sources were considered together (OR = 0.87, 95% CI = 0.57, 1.35) ($P = .5$) or when they were considered separately.

Since enforcement of the law may be more likely in a community that has taken the step of requiring lockout devices on vending machines, over-the-counter and vending machine sources in the same community were compared. In communities with no requirements for lockout devices, illegal sales were far more likely from vending machines than from over-the-counter sources (OR = 5.9, 95% CI = 3.3, 10.3) ($P = .0001$). By contrast, in communities where vending machines had been equipped with lockout devices, there was no significant difference in sales from the two sources. Illegal sales from locked machines were dramatically less common than were those from machines without locks (OR = 0.09, 95% CI = 0.04, 0.18) ($P = .0001$).

Youths were asked for proof of age 28% of the time (136/480 occasions). Boys (29%) and girls (28%) were equally likely to be asked for proof of age even though the girls appeared older than the boys. A sale was made in only 1.5% of instances in which proof of age was requested, in comparison with 45% of instances in which no request was made. Outlets participating in It's the Law programs may have been somewhat more likely to request proof of age than nonparticipating outlets (79/240 vs 57/240 occasions; OR = 1.45, 95% CI = 0.97, 2.2) ($P = .07$), but not enough so as to result in a significant reduction in illegal sales.

Illegal sales from over-the-counter outlets were not significantly reduced in communities where locking devices were required relative to communities without such requirements (OR = 0.75, 95% CI = 0.39, 1.47) ($P = .4$).

TABLE 1—The Relationship of Study Variables to the Rate of Illegal Sales of Tobacco to Minors: Bivariate Analysis

	Purchase Attempts, No.	Completed Purchases, No. (%)	<i>P</i>
Overall	480	157 (33)	
Gender of buyer			
Male	240	68 (28)	< .05
Female	240	89 (37)	
Age, y			
< 16	320	80 (25)	< .001
≥ 16	160	77 (48)	
Apparent age, y			
< 16	280	66 (24)	< .001
≥ 16	200	91 (45)	
Source of cigarettes			
Over-the-counter vendor	240	55 (23)	< .001
Vending machine	240	102 (42)	
Presence of lock on machine			
Yes	102	16 (16)	< .001
No	102	86 (62)	
Source in communities not requiring locks on vending machines			
Over-the-counter vendor	138	35 (25)	< .001
Vending machine	138	86 (62)	
Source in communities requiring locks on vending machines			
Over-the-counter vendor	102	20 (20)	NS
Vending machine	102	16 (16)	
Merchant participation in It's the Law programs			
Yes	240	71 (30)	NS
No	240	86 (36)	
Proof of age			
Requested	136	2 (1)	< .0001
Not requested	344	155 (45)	

Discussion

There has been a measurable improvement in merchant compliance in Massachusetts over the past 8 years. In 1986, an 11-year-old girl successfully bought tobacco in 75 of 100 attempts.¹⁸ Even the most mature appearing 17-year-old in our study did not approach this success rate. Despite this progress, youths of all ages still have easy access to tobacco: the most youthful appearing 12-year-old in our study could buy from one in five vendors.

Since It's the Law stickers call attention to the fact that it is illegal to sell tobacco to minors, merchants who choose to display them may be those who are least inclined to break the law to begin with. Since the merchants participating in It's the Law programs were self-selected, our study design biased the results in favor of finding these programs to be effective. Nevertheless, the It's the Law programs failed to produce a significant

reduction in the illegal sale of tobacco to minors.

In many instances, elected officials have been convinced that enforcement of the law is unnecessary since the industry is now dealing with the problem through It's the Law programs. While these programs may be well intentioned, they are ineffective in reducing illegal sales and may actually be detrimental to the public health to the extent that they result in a delay in implementing effective enforcement efforts.

This study supports the argument that vending machines equipped with lockout devices are equivalent to over-the-counter sources in terms of illegal sales. Since this study sought out vending machines with locks installed, our conclusions would apply only to the ideal situation in which locks have been installed on all vending machines. Experience in Utah, Minnesota, and Massachusetts has revealed that even when lockout

devices are required by law, vending machine owners frequently fail to install them.⁹ Because lockout devices involve a human interaction, they are not fool-proof. In this study, youths could buy tobacco as frequently from locked vending machines as they could from over-the-counter sources in the same communities. Since lockout devices do not render vending machines inaccessible to youths, enforcement of the law is still necessary to minimize illegal sales from locked vending machines.

A ban on vending machines may be desirable for reasons other than youth access. A ban can dramatically reduce the burden of enforcing the law: vending machines account for less than 2% of cigarette sales nationally¹⁹; however, at least in some Massachusetts communities, they represent nearly half of the outlets for tobacco. Also, alcohol is not sold from vending machines, and allowing the sale of tobacco from machines may imply a more casual attitude toward the sale of tobacco to minors. One advantage of vending machines relative to over-the-counter sources is that cigarettes cannot be shoplifted.

In this study, as in others, girls were more successful at purchasing tobacco than were boys, even when their older appearance was controlled.^{3-6,11,14,15} Since age and gender are predictors of success at purchasing tobacco, surveys conducted with different youths may be comparable only if youths of similar age and gender are involved.

We found that experienced school personnel could not accurately assess chronological age based on appearance. Youths vary tremendously in physical maturity, and only 3 of our 12 youths were judged to "look their age." This study rated apparent age by using photographs, but factors other than appearance may

also influence the assessment of age (e.g., personality, confidence, and voice).

Tobacco laws must be written to require proof of age and to eliminate any reference to "exercising reasonable judgment" as to the apparent age of a customer. Many 16- and 17-year-olds appear to be 18 years of age to reasonable observers. Sales clerks should be trained not to rely on their judgment as to how old a person appears to be but to require proof of age from any customer who is not obviously 25 years of age or older. In this study, illegal sales were extremely rare when proof of age was requested.

Since our youths were successful in 33% of their attempts, one might conclude that 67% of merchants obey the law. In fact, only 28% of the merchants consistently obeyed the law. The vast majority broke the law on some occasions but not others. A single round of inspections cannot be used to divide merchants into those who do, or do not, sell tobacco to minors. □

Acknowledgment

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