

Methods, Locations, and Ease of Cigarette Access for American Youth, 1997–2002

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Background: The purpose of this paper is to examine trends in middle and high school students' perceived ease, methods, and locations of access to cigarettes, and to assess differences related to their sociodemographic characteristics and smoking status.

Methods: Annual data from nationally representative samples of 8th-, 10th-, and 12th-grade students were analyzed for the 1997–2002 period. Analyses were conducted in 2003.

Results: Perceived ease of access decreased significantly among never and past smokers. Decreased individual purchasing in retail outlets, as well as decreased purchasing from vending machines, were reported by 8th- and 10th-grade students. All grades reported decreased purchasing from self-service placements of cigarettes. Decreases in access were not reported across all retailer types, and no significant increases were seen in the percent of underage purchasers who reported being asked to show identification. Both gender and ethnicity were significantly related to where and how underage youth reported obtaining cigarettes.

Conclusions: Cigarette access for minors has been declining, but remains high. Findings show that (1) perceived access to cigarettes clearly increases with level of smoking, and (2) policies to reduce such access may be having an impact as evidenced by decreased retail and vending machine purchases and self-service purchases. However, states should continue to strengthen efforts to reduce youth cigarette access, especially in the areas of confirming buyer age via identification checks, and should make efforts to decrease access across all retailer types. Federal regulations like those previously implemented by the Food and Drug Administration might strongly assist in reducing youth access to cigarettes.

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Introduction

Nationwide efforts to reduce minors' access to tobacco products have had limited success, including the 1992 Synar Amendment^{1,2} and the Food and Drug Administration (FDA)³ attempt to regulate the sale and distribution of tobacco to minors. State and local efforts have fared somewhat better, including policies such as minimum purchase age, photo identification, vending machine bans, and random inspections.⁴ However, debate exists on the efficacy of such policies. Some argue that tobacco-access policies have shown no indications of effectiveness, and that anti-tobacco advocates should reject access measures in favor of other, more effective approaches.^{5,6} Others believe that extensive and well-enforced youth access programs can significantly lower youth smoking by preventing youth from purchasing cigarettes di-

rectly, and/or strengthening social norms that discourage smoking behaviors and raise expectations that cigarettes will not be easy to obtain.^{7–10} The majority of research has been mixed on the issue, highlighting unknowns in terminology, evaluation, outcomes, and enforcement.^{10–14} Given the developing body of policy focused on tobacco access, research is needed that can better evaluate the effectiveness of such efforts across policy types and smoking behaviors. However, a related need is for national documentation of tobacco access behaviors among American youth.

Both social and commercial cigarette sources play significant roles in youth smoking.¹¹ Smoking consumption, gender, age, and ethnicity play important roles in social versus commercial cigarette sources. Regular smokers, males, older smokers, and whites are more likely to utilize commercial sources.^{15–22} Commercial sources are not used equally. Gas stations and convenience stores are the primary retail suppliers of cigarettes to minors^{21,22} (and also have the highest rates of pro-tobacco advertising and marketing, and self-service access to tobacco products).²³

Underage commercial cigarette access also is affected by merchant requests for photo identification

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Table 1. Trends (%) in smoking behavior among American 8th, 10th, and 12th graders^a

Smoking participation level	1997 (Referent)	1998	1999	2000	2001	2002
Nonsmokers						
8th grade	54.0	55.7	56.9	62.4***	65.2***	69.1***
10th grade	40.6	41.7	42.7	44.9**	49.0***	53.4***
12th grade	34.9	40.1	37.8	41.1*	41.8*	46.3***
Past smokers						
8th grade	26.6	24.4	25.0	23.4*	22.8**	19.9***
10th grade	29.4	28.7	31.3	30.2	29.6	28.9
12th grade	29.3	25.8	29.7	25.4	31.1	28.7
Current nondaily smokers						
8th grade	11.2	11.7	10.1	7.5***	6.8***	6.2***
10th grade	11.8	12.9	9.8**	10.8	9.6**	8.1***
12th grade	12.6	13.1	10.7	13.3	11.4	10.5
Current daily smokers						
8th grade	8.3	8.2	8.0	6.7	5.3***	4.8***
10th grade	18.3	16.8	16.3	14.1**	11.9***	9.6***
12th grade	23.3	20.0	21.8	19.2	14.7**	14.5***

^aN=27,740 for 8th grade; 25,598 for 10th grade; and 5573 for 12th grade.

Significance levels from bivariate logistic regression analyses (year entered using dummies with 1997 as referent):

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$ (bolded).

(ID) prior to sale. National studies have shown that only 30% to 40% of minors who purchased cigarettes from a store were asked to show proof of age,^{19,22} and failure to request ID has been significantly associated with illegal sales.²⁴ However, some research indicates that simple presentation of ID may actually be associated with increased illegal sales if clerks do not confirm identity or calculate age.^{25,26}

Attention to youth cigarette access began to grow in the early 1990s. However, few publications have addressed national tobacco access issues, and none has combined trend data for both middle and high school samples. Data on high school cigarette access as measured by the Youth Risk Behavior Surveillance study have been available since 1996,^{19,27-30} and findings on tobacco access among middle and high school students have been published using data from the 1999 National Youth Tobacco Survey²² and the 2001 National Household Survey on Drug Abuse.²¹ However, there remains a need for a national, multi-year summary of trends in tobacco access for both U.S. middle and high school youth. This paper provides such information by reporting on 6 years of cross-sectional data (from 1997 to 2002) on perceived ease, methods, and locations of cigarette access for nationally representative samples of 8th-, 10th-, and 12th-grade students. Results are examined for secular trends, as well as smoking consumption, gender, and racial/ethnic differences.

Methods

Data were obtained from the Monitoring the Future study,^{31,32} and were collected yearly from 1997 to 2002 using

self-completed, group-administered surveys with sampling representative of all 8th-, 10th-, and 12th-grade students in the 48 contiguous states. Response rates averaged 89% for 8th, 86% for 10th, and 83% for 12th grade. Only students aged <18 were retained for the present analyses (conducted in 2003).

Perceived ease of cigarette access was measured by asking 8th and 10th grade students, "How difficult do you think it would be for you to get [cigarettes], if you wanted some?" Responses ranged from 1 (probably impossible) to 5 (very easy), and were dichotomized into "very easy" versus "other" (response categories 1 to 4) based on the data distribution (12th grade students were not asked about perceived ease of cigarette access).

Smoking behavior was defined as follows: never smokers, past smokers (those who smoked in the past, but not in the past 30 days), current (past 30 days) nondaily smokers, and current (past 30 days) daily smokers. A final category, current smokers, combined both current nondaily and daily smokers. Current smokers were asked about methods and locations used to obtain cigarettes. Items on access methods used the question stem, "During the last 30 days, about how many times (if any) have you bought cigarettes . . .": (1) "by having a friend or relative buy them for you"; (2) "on your own from vending machines"; (3) "through the mail"; (4) "in a store where you pick up the pack (or carton) and bring it to the check-out counter" (self-service); and (5) "in a store where the clerk has to hand you the pack or carton" (clerk assist). Items on access locations used the question stem, "During the last 30 days, about how many times (if any) did YOU buy cigarettes for your own use . . .": (1) "at a big supermarket"; (2) "at a small grocery store"; (3) "at a drugstore"; (4) "at a convenience store (like a Hop-In or 7-11) or a gas station"; and (5) "from a Web site" (Web site alternative was added in 2002). For all access method and location items, responses were dichotomized as "any" purchase from the specified

method/location, and “none” if no purchase occurred from the specified method/location. An additional dichotomy was created that indicated purchasing cigarettes from **any** retail establishment within the past 30 days (excluding friend/relative, vending machine, mail, and Internet purchase).

Past and current smokers were asked about requests for ID as well as purchasing less than a full pack of cigarettes (“loosies”). A yes/no measure was created from the question, “The last time that you tried to buy cigarettes in a store or gas station, were you asked for proof of age?” An additional yes/no measure was created for reported purchasing of loosies in the past 12 months.

Students were asked their gender, ethnicity (white, black, Hispanic, and other), total average weekly income (both earned and other income, adjusted for the 1982–1984 Consumer Price Index), and the average educational level of their parent(s) (used as a proxy for family socioeconomic status). Average parental education ranged from 1 to 6 and was a combined average of mother’s and father’s highest level of education, where 1=grade school or less, 2=some high school, 3=high school completion, 4=some college, 5=college completion, and 6=graduate school.

Analyses used survey commands in SAS, release 8.2 (SAS Institute, Cary NC, 2001), and STATA, release 8 (StataCorp, College Station TX, 2003) for descriptive population estimates, time trends, and multivariate logistic regression. In multivariate regressions, year was split into three groups: 1997–1998, 1999–2000, and 2001–2002. The complex multi-stage sample design was accounted for by using sampling weights to adjust for differential selection probabilities, and by using Taylor linearization-based variance estimators to adjust for clustering by school.

Results

A total of 34,910 8th graders, 29,537 10th graders, and 6158 12th graders (aged <18) responded to forms containing tobacco-access related items. After removing cases with missing data on control variables, sample sizes were 27,740 8th graders, 25,598 10th graders, and 5573 12th graders. Student characteristics (combining grades and years) were 53% female, 13% black, 11% Hispanic, 66% white, and 10% other. Regional distribution was 19% Northeast, 26% North Central, 36% South, and 19% West. Mean average parental education was 3.96; mean adjusted individual weekly income was \$22.60. Cigarette smoking rates and trends are shown in Table 1. Significant decreases in smoking prevalence and daily smoking rates for all grades were seen over time ($p < 0.001$).

Perceived Ease of Cigarette Access

Combined across years, 58% of 8th graders and 78% of 10th graders reported that it would be “very easy” to obtain cigarettes. Table 2 and Figure 1 demonstrate that perceived ease of cigarette access was closely tied to smoking consumption. Table 2 presents multivariate logistic regression model results investigating smoking consumption, gender, ethnic-

Table 2. Perceived access to cigarettes: population estimates and results from multivariate logistic regression analyses (percent saying “very easy” to get)^a

Independent variables	8th grade		10th grade	
	%	<i>p</i>	%	<i>p</i>
Never smokers	46.3	(ref)	67.8	(ref)
Past smokers	68.0	***	81.6	***
Current nondaily smokers	79.7	***	87.7	***
Current daily smokers	88.6	***	91.8	***
Male	57.9	(ref)	77.6	(ref)
Female	57.3		77.6	
White	59.3	(ref)	80.6	(ref)
Black	55.0	**	68.7	***
Hispanic	56.3	***	71.7	***
Other	51.5	***	71.8	***
1997–1998	62.0	(ref)	81.0	(ref)
1999–2000	57.7	**	78.2	**
2001–2002	52.4	***	73.4	***

^aMultivariate analyses included all variables listed above, as well as average parental education level and individual income (not shown). Significance levels from bivariate logistic regression analyses (year entered using dummies with 1997 as referent):

N=23,966 for 8th grade, and 23,729 for 10th grade.

** $p < 0.01$;

*** $p < 0.001$ (bolded).

ity, and time-trend relationships with perceived ease of cigarette access, while controlling for average parental education and student income. More-recent and heavier smokers were more likely to report easy access; post hoc comparisons indicated the odds of perceiving easy cigarette access differed significantly for all smoking levels ($p < 0.001$). No significant gender relationships were observed; minorities perceived less ease of access than whites. Table 2 shows highly significant decreases in perceived access over time. Figure 1 indicates that declines were concentrated among never smokers, but they also occurred among past smokers. Separate multivariate models (not shown) showed significant decreases over time in ease of access among 8th-grade never smokers ($p < 0.01$) and 10th-grade never and past smokers ($p < 0.05$).

Methods and Locations of Obtaining Cigarettes Among Current Smokers

An average of 65% of current smokers reported obtaining cigarettes from friends or relatives within the past 30 days, making this the most frequently mentioned source, with relatively little difference between grades (62% for both 8th and 12th grade; 67% for 10th grade) and no significant time trends. Females were more likely than males, and blacks were less likely than whites, to report obtaining cigarettes from friends or relatives (see Table 3).

Half of all current smokers (51%) reported personally purchasing cigarettes from some type of retail establishment—42% of 8th graders, 53% of 10th grad-

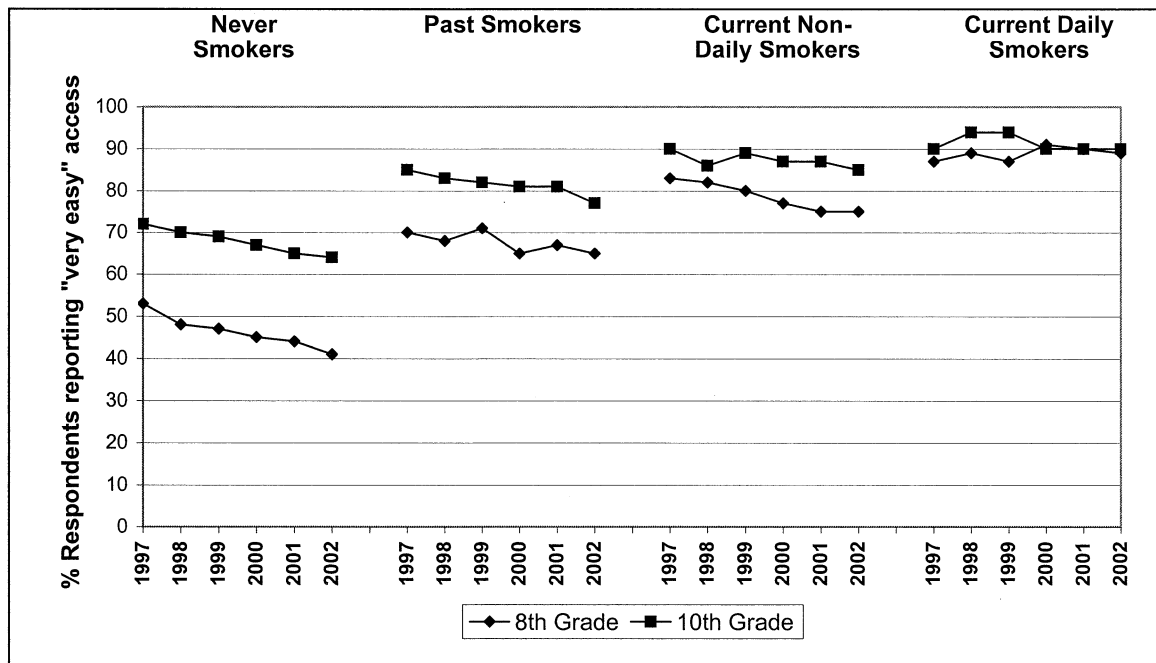


Figure 1. Perceptions of “very easy” access to cigarettes among 8th and 10th graders, by smoking status. Total 8th grade N=23,966; 10th grade N=23,729. See Table 1 for overall time-trend significance levels. CS, current smokers; T, total sample.

ers, and 65% of 12th graders. Figure 2 shows trends in store purchases by grade over time. Multivariate analyses (Table 3) indicate that males were more likely than females to report purchasing cigarettes from a retail outlet, and significantly so for both 10th and 12th graders. The only significant racial/ethnic relationships

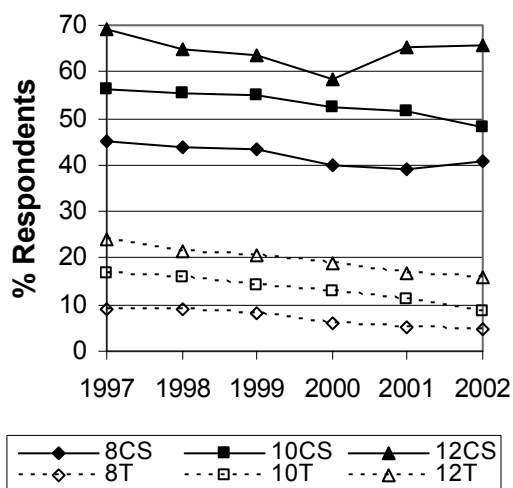


Figure 2. Any retail cigarette purchase in the past 30 days reported by current smokers (CS) and the total sample (T). Grade is indicated by number in legend. Numbers of current smokers reporting purchases were 4433 8th graders, 6422 10th graders, and 1750 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels. CS, current smokers; T, total sample.

observed were for 8th graders: Hispanics and “other minority” students were more likely than whites to report recent cigarette purchases. Compared to 1997–1998, 8th and 10th graders reported purchasing cigarettes less often in 2001–2002.

Figures 2 and 3 show a striking contrast between the percentage of underage current smokers who reported successfully purchasing cigarettes within the last 30 days, and those who were asked to provide proof of age at their last purchase attempt: only 25% of 8th graders, 36% of 10th graders, and 40% of 12th graders reported being asked to provide proof of age (Figure 3). Table 3 shows no significant differences in ID requests by race/ethnicity (all grades) or gender for 8th or 12th graders (10th-grade females did report lower odds of ID requests). No time trends were observed. While all other outcomes showed clear differences across grades by smoking consumption level, requests for ID were associated with smoking level only for 10th graders ($p < 0.01$; data not shown).

Clerk-assisted placement purchases were more common than self-service placement for all grades (Figures 4 and 5). Among current smokers, 20% of 8th graders, 35% of 10th graders, and 51% of 12th graders reported purchasing cigarettes where they had to request clerk assistance for purchase (like behind-the-counter displays). Only 16% of 8th graders, 24% of 10th graders, and 30% of 12th graders reported bringing a pack of cigarettes to the counter for purchase. Figure 4 and Table 3 show that the likelihood of self-service placement purchase dropped considerably over time, espe-

Table 3. How and where currently smoking youth purchased cigarettes: population estimates and results from multivariate logistic regression analyses^a

Grade	Total %	Male		White		Black % <i>p</i>	Hispanic % <i>p</i>	Other % <i>p</i>	1997–1998 (ref) %	1999–2000 % <i>p</i>	2001–2002 % <i>p</i>
		(ref) %	Female % <i>p</i>	(ref) %	Black % <i>p</i>						
Friend/relative purchased, past 30 days											
8	62.2	56.5	66.9***	64.4	52.4*	60.1	57.9	61.4	63.6	61.6	
10	67.0	60.6	72.5***	69.1	52.1**	60.2	63.2	67.6	66.8	66.2	
12	62.2	52.9	68.8***	63.5	42.6*	59.0	65.0	64.2	58.8	63.5	
Individually purchased pack at store, past 30 days											
8	42.2	45.0	39.8	39.7	41.2	52.2***	47.2**	43.8	41.9	39.4*	
10	53.2	57.8	49.2***	53.4	53.8	49.6	55.1	55.7	53.4	48.7*	
12	64.7	71.7	59.7***	64.9	65.5	62.4	64.2	67.1	62.0	64.4	
Asked for ID, last purchase attempt											
8	25.0	27.2	22.6	24.3	25.5	30.0	22.4	26.1	22.2	26.6	
10	36.1	40.3	31.4***	36.4	31.8	39.8	31.6	36.6	36.2	34.8	
12	40.1	42.2	38.2	40.4	26.1	46.4	38.4	40.7	41.0	37.3	
Placement of cigarettes when purchased, past 30 days											
Self-service											
8	16.0	18.7	13.8	14.6	16.5	20.1*	20.0*	17.2	16.0	13.7*	
10	24.1	28.6	20.1***	24.1	24.0	23.0	24.9	27.8	24.5*	17.5***	
12	29.5	36.7	24.2***	30.5	20.5	23.1	31.6	36.3	27.9**	19.9***	
Clerk-assist											
8	19.5	21.7	17.6	17.6	23.2*	25.4**	22.3	21.8	18.3**	16.8**	
10	34.5	39.5	30.2***	34.7	35.3	30.5	36.7	36.4	35.6	30.1	
12	50.7	58.6	44.9***	51.3	40.9	51.6	48.7	52.8	49.5	48.5	
Retailer types where purchased, past 30 days											
Convenience											
8	35.4	37.2	33.8	34.6	30.9	40.7**	37.7	37.0	35.0	32.7	
10	47.3	51.2	43.9***	48.0	46.6	42.0	46.2	49.0	48.1	43.3	
12	57.4	66.1	51.1***	58.3	52.0	53.4	55.9	57.7	57.4	56.7	
Small grocery											
8	21.5	24.2	19.2	19.2	22.1	31.1***	24.8*	22.6	22.3	18.1**	
10	24.1	27.2	21.4***	23.7	27.7*	25.1	24.4	26.3	24.6	19.8**	
12	27.8	32.3	24.5**	27.4	24.6	25.3	36.4	31.0	23.7*	27.8	
Supermarket											
8	9.8	12.1	7.8**	8.8	8.4	16.4***	10.1	10.8	10.2	7.3**	
10	10.3	12.8	8.1***	9.9	13.3	10.9	11.6	11.1	10.9	8.3	
12	14.9	18.5	12.4*	14.3	15.1	15.4	21.5	15.4	15.0	14.0	
Drugstore											
8	13.1	15.6	11.1	11.3	14.1	19.6***	17.0**	14.5	12.1*	11.9	
10	11.2	12.7	9.8*	10.8	13.9*	11.5	12.6	12.2	11.8	8.7*	
12	13.4	14.0	12.9	12.6	12.0	11.5	24.9**	15.3	10.8*	13.7	
Purchased from vending machine, past 30 days											
8	15.6	18.4	13.2**	15.0	10.6*	19.3*	18.5	18.7	14.0**	11.7***	
10	10.1	11.8	8.6**	9.9	13.4	10.3	8.9	13.2	9.8**	5.2***	
12	9.3	9.5	9.2	8.9	10.3	8.4	14.5	12.5	6.6**	7.6	
Purchased loosies (< full pack), past 12 months											
8	9.6	10.6	8.8	7.1	19.2***	17.0***	10.1	9.6	8.2	11.9	
10	6.9	8.5	5.5**	4.5	24.3***	15.9***	8.9**	6.7	6.9	7.0	
12	6.3	8.6	4.6*	4.6	22.4***	13.3***	5.5	5.8	4.6	9.5*	

^aMultivariate logistic regression analyses were run separately by grade and included all variables listed above, as well as smoking consumption level (current daily smoking vs current nondaily smoking), average parental education level, and individual income (not shown in table). Males, whites, and 1997–1998 were used as referent categories. For proof of age, N=1557, 8th; 3316, 10th; 1258, 12th. For all other outcomes, N ranges are 4288 to 4433, 8th; 6229 to 6422, 10th; 1713 to 1750, 12th.

Significance levels from logistic regression analyses:

**p*<0.05;

***p*<0.01;

****p*<0.001 (bolded).

cially for 10th and 12th graders. Tenth- and 12th-grade males were significantly more likely to report purchases under both placement types. Hispanic and “other minority” 8th graders were more likely than white 8th graders to report self-service purchases; Hispanic and black 8th graders were more likely to report clerk-assisted purchases.

There were substantial differences in underage sales by retail establishment type (see Figures 6 to 9). The most common locations were convenience/convenience–gas

stores (35%, 47%, and 57% in 8th, 10th, and 12th grades, respectively; Figure 6), followed by small grocery stores (22%, 24%, and 28%; Figure 7). Supermarkets and drugstores were less commonly reported as recent purchase locations (10%, 10%, and 15% in Figure 8; 13%, 11%, and 13% in Figure 9, respectively). Males were generally more likely than females to purchase cigarettes from any retailer type, although differences were not always significant. In the 8th grade, Hispanics were more likely than whites to utilize all retailer types. Tenth-grade black stu-

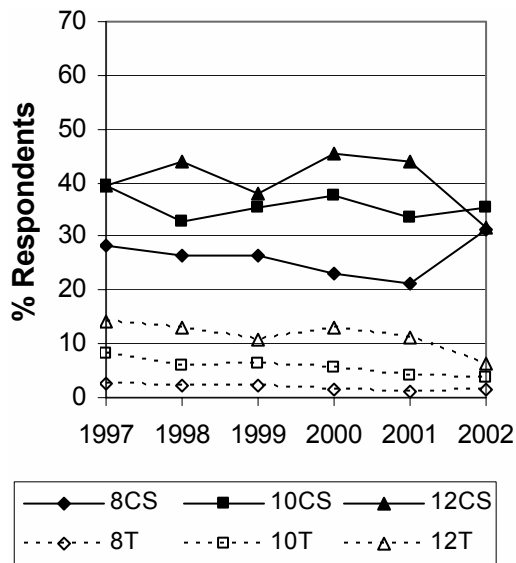


Figure 3. Requests for ID at last purchase attempt reported by current smokers (CS) and the total sample (T). Grade is indicated by number in legend. Numbers of current smokers reporting being asked for ID were 1557 8th graders, 3316 10th graders, and 1258 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels.

CS, current smokers; T, total sample.

dents were more likely than whites to report purchasing at small grocery stores and drugstores. Underage purchasing from all retailer types showed an ordinal decline over the three time intervals compared in Table 3 (although rather little for 12th grade), but only purchases at small

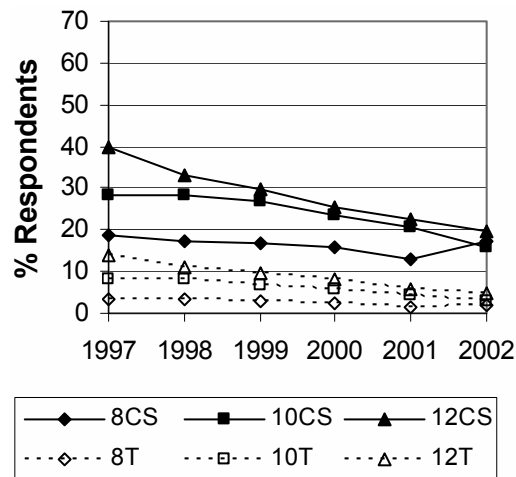


Figure 4. Self-service cigarette pack placement reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers for current smokers were about 4300 8th graders, 6300 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels.

CS, current smokers; T, total sample.

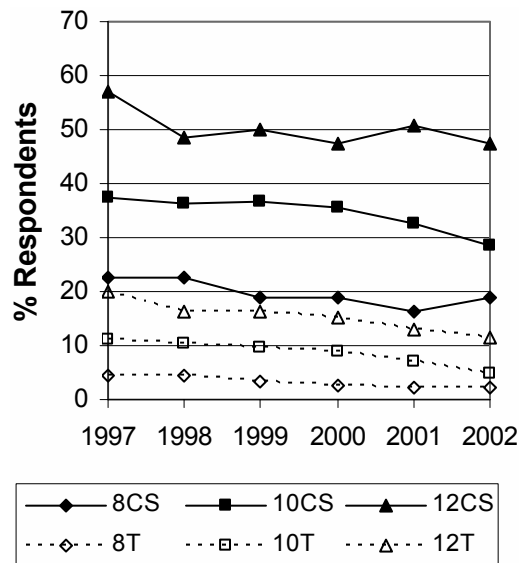


Figure 5. Clerk-assisted cigarette pack placement reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers of current smokers were about 4300 8th graders, 6300 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels.

CS, current smokers; T, total sample.

grocery stores appeared to decline significantly across grades.

Few current smokers reported purchasing cigarettes through vending machines or the nontraditional retail avenues of the mail and the Internet. Eighth-grade

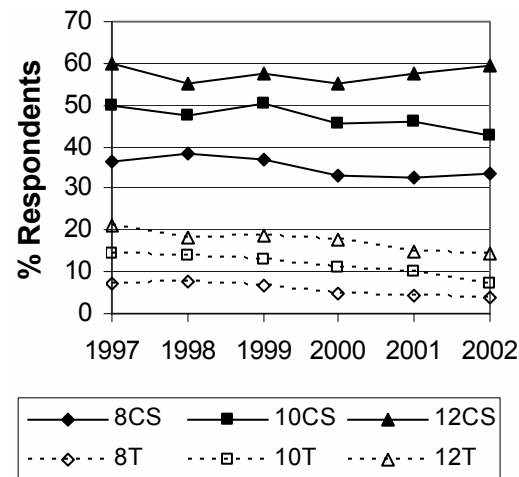


Figure 6. Cigarette purchasing at convenience/convenience-gas outlets reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers of current smokers were about 4300 8th graders, 6300 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels.

CS, current smokers; T, total sample.

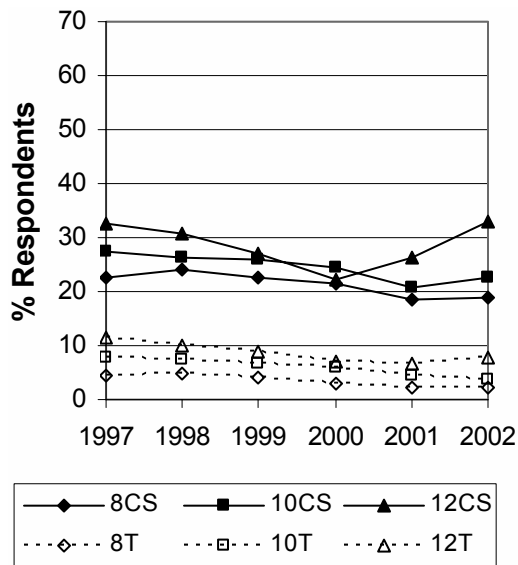


Figure 7. Cigarette purchasing at small grocery stores reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers of current smokers were about 4300 8th graders, 6300 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels. CS, current smokers; T, total sample.

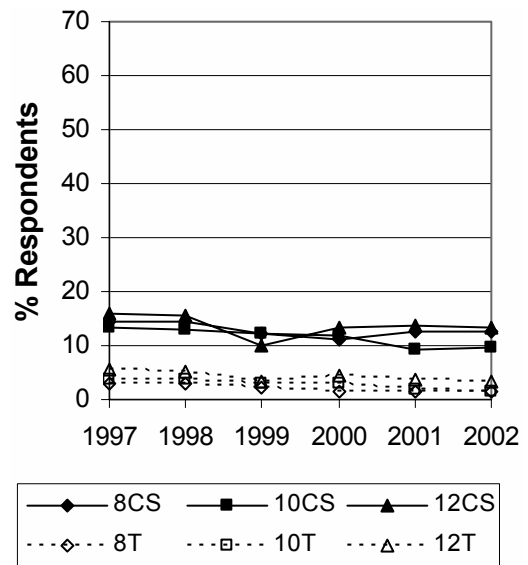


Figure 9. Cigarette purchasing at drugstores reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers of current smokers were about 4300 8th graders, 6200 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,400 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels. CS, current smokers; T, total sample.

smokers were the most likely to use these venues; of 8th-, 10th-, and 12th-grade current smokers, respectively, 16%, 10%, and 9% purchased from vending machines (Figure 10); 4%, 2%, and 1% purchased by mail; and 3%, 2%, and 1% purchased through the Internet. Due to very low use of mail and Internet to

obtain cigarettes, multivariate analyses were conducted only on vending machine purchases. As with the other retail purchasing locations, males used vending machines more than females, significantly so for 8th and 10th graders. Significant decreases over time in vending machine use were observed across grades.

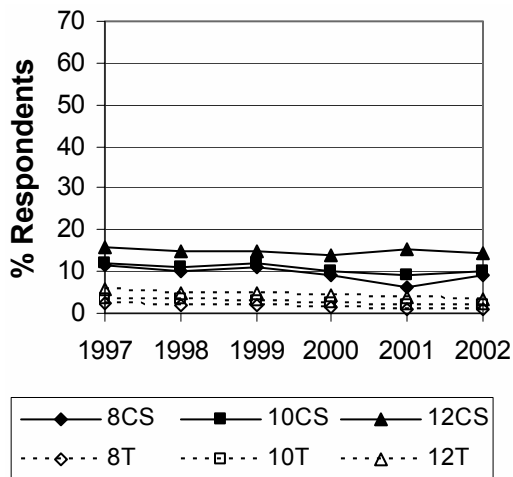


Figure 8. Cigarette purchasing at supermarkets reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers of current smokers were about 4300 8th graders, 6200 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,400 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels. CS, current smokers; T, total sample.

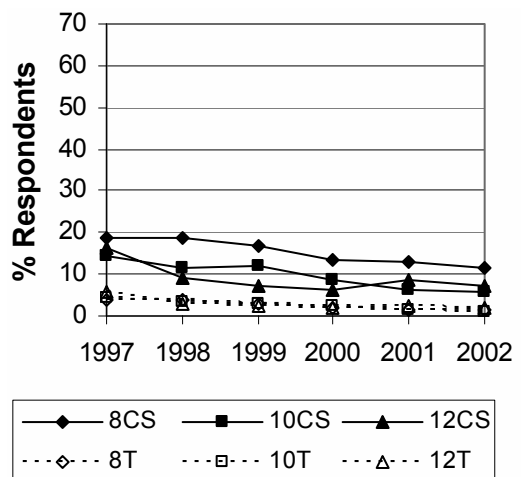


Figure 10. Vending machine purchases reported by current smokers (CS) and total sample (T). Grade is indicated by number in legend. Numbers of current smokers were about 4300 8th graders, 6300 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels. CS, current smokers; T, total sample.

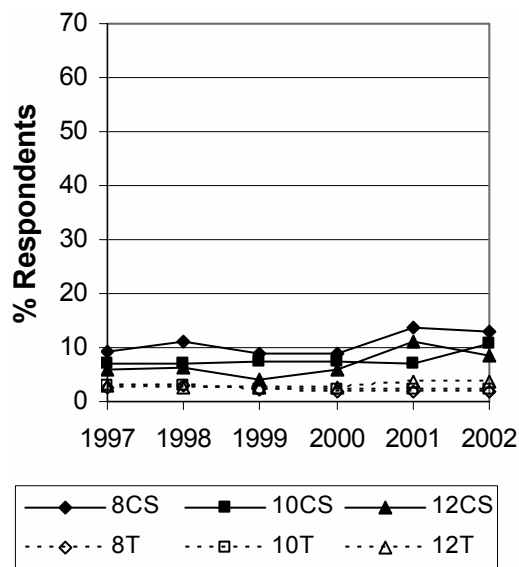


Figure 11. “Loosie” purchases (less than full pack) reported by current smokers (CS) and total sample (T). Numbers of current smokers were about 4300 8th graders, 6300 10th graders, and 1700 12th graders. Total sample numbers were about 27,600 8th graders, 25,500 10th graders, and 5500 12th graders. See Table 3 and text for time-trend significance levels. CS, current smokers; T, total sample.

An average of 8% of current smokers reported purchasing loose cigarettes within the past 12 months. Eighth graders were more likely to report such purchases than older students (10% vs 7% and 6% for 10th and 12th graders; Figure 11), and 10th- and 12th-grade females were less likely to report purchasing them than males. Minority students were far more likely to report such purchases than whites.

While this paper focuses on cigarette purchasing behaviors among current smokers, it is informative to provide some data on these behaviors among the entire student population (regardless of smoking status). Figures 2 through 11 include trend data by grade for all students. Due to space restrictions, multivariate results for total population models are not shown. However, consistent and significant ($p < 0.05$) decreases over time were observed for self-service placement (all grades); purchasing at any type of retailer, ID requests, and vending machine purchases (8th and 10th grades); and clerk-assist placement, convenience and drug store purchases (8th grade).

Discussion

The importance of reducing minors’ access to cigarettes rests primarily on the assumption that less youth smoking will result, either overall or at specific points along the uptake continuum. Cigarette smoking prevalence among U.S. youth has dropped substantially since 1997 (although rates remain too high, with 25% of students becoming current smokers by 12th

grade).³² These data indicate that perceived ease of cigarette access also showed an appreciable drop during the same period, particularly among never smokers and past smokers. The covariation between smoking consumption and perceived access is consistent with the hypothesis that perceived availability influences smoking. The influence could occur because it reflects a real increase in difficulty obtaining cigarettes or perhaps by creating expectations that cigarettes will be difficult to buy. The fact that past smokers perceived lower access than current smokers also would be consistent with the notion that reducing access discourages smoking continuation. However, because the present study does not have panel data on individuals, definitive conclusions cannot be drawn. The observed covariation could reflect other causal patterns; for example, those who no longer smoke may be out of contact with the changing environments through which cigarettes can be accessed, and therefore conclude that cigarettes are harder to obtain than they actually are. The data on both perceived access and smoking are based on self-reports. We believe that this is not a significant limitation for the smoking variables, because research has supported the validity of self-report data for these outcomes, given the particular data collection procedures used.^{33–35}

Prior research has theorized that access issues would not relate to young persons’ early experimentation, because such smokers do not typically purchase their own cigarettes.¹⁸ Indeed, the data presented highlight the importance of social cigarette sources: 65% of current smokers reported obtaining cigarettes from friends or relatives within the last 30 days. However, the appreciable decline observed in perceived access among never smokers, combined with the increase in the percentage of youth reporting never smoking, supports a relationship between perceived ease of access and the transition from never smoking to experimentation. These results are consistent with recent findings that indicate increased cigarette access law enforcement may have a protective effect on youth smoking experimentation.⁹

Between 42% and 65% of all underage current smokers in each grade reported purchasing cigarettes at a store in just the past month, suggesting considerable retailer non-compliance with underage sales regulations. High purchase rates at clerk-assisted locations indicate that students often produce false identification or encounter clerks who fail to ask for ID or to calculate age. The fact that 8th-grade smokers purchasing cigarettes were the least likely to be asked to provide ID may indicate that younger students go to outlets where clerks are known not to require identification. These results underscore the point that one noncompliant retailer or clerk who is known to sell is all it takes to keep access open. The proportion of underage smokers purchasing cigarettes at convenience stores or gas stations has shown no decrease,

which indicates that these retail venues play an important role in providing such access.

The data clearly show some of the effects sought by policymakers: the proportion of current smokers making retail purchases declined in the lower grades. Further, the proportion reporting self-service placement purchases (such placement has been associated with both increased illegal sales and shoplifting³⁶) also declined. Finally, there were significant decreases in underage purchasing from small grocery stores and vending machines.

The findings on both gender and race/ethnicity deserve further discussion. Consistent with prior research, females were more likely to report social cigarette sources, while males were more likely to report purchases from all commercial sources. However, there were no gender differences in overall ease of access. This highlights the importance of both developing a social context that discourages tobacco use (thus reducing prevalence and acceptance among friends/relatives), along with improving retail sales compliance.

The race/ethnicity findings are interesting. Minorities reported somewhat lower overall perceived availability than white students. Black students reported less access through friends and relatives, specifically, perhaps reflecting the considerably lower prevalence rates among their friends.³² Eighth-grade Hispanic and black students were more likely to report clerk-assisted sales and having bought loosies. More 8th-grade Hispanic students than white students reported that they purchased for themselves, purchased from self-service displays, and purchased at convenience and small grocery stores. These results likely reflect differences in both the nature of, and practices in, the retail environment in minority neighborhoods—differences that likely facilitate underage purchasing of cigarettes.

In sum, progress has been made in reducing minors' access to cigarettes, but more remains to be done—especially regarding buyer age confirmation and achieving decreased access across all types of retailers. The findings presented here are consistent with the notion that lowering availability reduces youth smoking, although they do not prove it. Federal and state efforts, supported in large part by the now-defunct FDA regulations, appear to have made an important contribution to decreasing access by underage youth, which may in turn have contributed to the very significant decline in youth smoking in recent years.

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What This Study Adds . . .

This paper contributes to the youth tobacco access literature by reporting trends from 1997 to 2002 in perceived availability and purchasing experiences among U.S. middle school and high school youth.

Perceived availability declined among never and past smokers (coinciding with a decline in underage smoking), but not among current smokers.

Self-service, vending machine, and overall retail purchases decreased, but little decline occurred for gas station/convenience store purchases—the most common source for underage purchasing.

References

1. DiFranza JR. Are the federal and state governments complying with the Synar amendment? *Arch Pediatr Adolesc Med* 1999;153:1089–97.
2. DiFranza JR. State and federal compliance with the Synar amendment: federal fiscal year 1998. *Arch Pediatr Adolesc Med* 2001;155:572–8.
3. Food and Drug Administration. Regulations restricting the sale and distribution of cigarettes and smokeless tobacco products to protect children and adolescents. *Federal Register* 1995;60:41314.
4. Alciati MH, Frosh M, Green SB, et al. State laws on youth access to tobacco in the United States: measuring their effectiveness with a new rating system. *Tob Control* 1998;7:345–52.
5. Fichtenberg CM, Glantz SA. Youth access interventions do not affect youth smoking. *Pediatrics* 2002;109:1088–92.
6. Ling PM, Landman A, Glantz SA. It is time to abandon youth access tobacco programmes. *Tob Control* 2002;11:3–6.
7. Jason LA, Berk M, Schnopp-Wyatt DL, Talbot B. Effects of enforcement of youth access laws on smoking prevalence. *Am J Community Psychol* 1999;27:143–60.
8. Luke DA, Stamatakis KA, Brownson RC. State youth-access tobacco control policies and youth smoking behavior in the United States. *Am J Prev Med* 2000;19:180–7.
9. Gilpin EA, Lee L, Pierce JP. Does adolescent perception of difficulty in getting cigarettes deter experimentation? *Prev Med* 2004;38:485–91.
10. Forster JL, Murray DM, Wolfson M, et al. The effects of community policies to reduce youth access to tobacco. *Am J Public Health* 1998;88:1193–8.
11. Forster JL, Wolfson M. Youth access to tobacco: policies and politics. *Annu Rev Public Health* 1998;19:203–35.
12. Liang L, Chaloupka EJ, Nichter M, Clayton R. Prices, policies and youth smoking, May 2001. *Addiction* 2003;98(suppl 1):105–22.
13. Pokorny SB, Jason LA, Schoeny ME. The relation of retail tobacco availability to initiation and continued smoking. *J Clin Child Adolesc Psychol* 2003;32:193–204.
14. Rigotti NA, DiFranza JR, Chang Y, Tisdale T, Kemp B, Singer DE. The effect of enforcing tobacco-sales laws on adolescents' access to tobacco and smoking behavior. *N Engl J Med* 1997;337:1044–51.
15. Castrucci BC, Gerlach KK, Kaufman NJ, Orleans CT. Adolescents' acquisition of cigarettes through noncommercial sources. *J Adolesc Health* 2002;31:322–6.
16. Croghan E, Aveyard P, Griffin C, Cheng KK. The importance of social sources of cigarettes to school students. *Tob Control* 2003;12:67–73.
17. DiFranza JR, Coleman M. Sources of tobacco for youths in communities with strong enforcement of youth access laws. *Tob Control* 2001;10:323–8.
18. Emery S, Gilpin EA, White MM, Pierce JP. How adolescents get their cigarettes: implications for policies on access and price. *J Natl Cancer Inst* 1999;91:184–6.
19. Jones SE, Sharp DJ, Husten CG, Crossett LS. Cigarette acquisition and proof of age among US high school students who smoke. *Tob Control* 2002;11:20–5.
20. Levy DT, Friend KB. A simulation model of tobacco youth access policies. *J Health Politics Policy Law* 2000;25:1023–50.
21. Substance Abuse and Mental Health Services Administration. How youths get cigarettes. Rockville MD: Substance Abuse and Mental Health Services

- Administration, U.S. Department of Health and Human Services, November 22, 2002.
22. Ringel JS, Pacula RL, Wasserman J. Youth access to cigarettes: results from the 1999 National Youth Tobacco Survey. Washington DC: American Legacy Foundation, October 2000.
 23. Terry-McElrath YM, Wakefield M, Giovino G, et al. Point-of-purchase tobacco environments and variation by store type—United States, 1999. *MMWR Morb Mortal Wkly Rep* 2002;51:184–7.
 24. Clark PI, Natanblut SL, Schmitt CL, Wolters C, Iachan R. Factors associated with tobacco sales to minors: lessons learned from the FDA compliance checks. *JAMA* 2000;284:729–34.
 25. Landrine H, Klonoff EA, Lang D, Alcaraz R. Use of identification cards by underage youth to purchase tobacco. *JAMA* 2001;285:2329.
 26. Levinson AH, Hendershott S, Byers TE. The ID effect on youth access to cigarettes. *Tob Control* 2002;11:296–9.
 27. Kann L, Warren CW, Harris WA, et al. Youth risk behavior surveillance—United States, 1995. *MMWR Morb Mortal Wkly Rep* 1996;45(SS-4):1–83.
 28. Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance—United States, 1997. *MMWR Morb Mortal Wkly Rep* 1998;47(SS-3):1–89.
 29. Kann L, Kinchen SA, Williams BI, et al. Youth risk behavior surveillance—United States, 1999. *MMWR Morb Mortal Wkly Rep* 2000;49(SS-5):1–94.
 30. Grunbaum JA, Kann L, Kinchen SA, et al. Youth risk behavior surveillance—United States, 2001. *MMWR Morb Mortal Wkly Rep* 2002;51(SS-4):1–62.
 31. Bachman JG, Johnston LD, O'Malley PM. The Monitoring the Future project after twenty-seven years: design and procedures. *Monitoring the Future Occasional Paper Series No. 54*. Ann Arbor MI: Institute for Social Research, University of Michigan, 2001.
 32. Johnston LD, O'Malley PM, Bachman JG. Monitoring the Future national survey results on drug use, 1975–2002. Volume 1: Secondary school students. Bethesda MD: National Institute on Drug Abuse, August 2003.
 33. Harrison LD. Validity of self-reported data on drug use. *J Drug Issues* 1995;25:91–111.
 34. O'Malley PM, Bachman JG, Johnston LD. Reliability and consistency in self-reports of drug use. *Int J Addict* 1983;18:805–24.
 35. Wallace JM, Bachman JG. Validity of self-reports in student-based studies on minority populations: issues and concerns. In: De La Rosa MR, Recio Adrados J-L, eds. *Drug abuse among minority youth: advances in research and methodology*. NIDA research monograph 130. Rockville MD: National Institute on Drug Abuse, 1993:167–200.
 36. Willey MB, Woodruff SI, Pampalone SZ, Conway TL. Self-service sale of tobacco: how it contributes to youth access. *Tob Control* 1995;4:355–61.