



STUDY OF YOUTH SMOKING AND STATE LAWS PROHIBITING THE PURCHASE, POSSESSION, AND/OR USE OF CIGARETTES

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Background

- The U.S. Surgeon General and others have documented that tobacco control policies can be used to promote reductions in tobacco use.
- Recent trends indicate a sharp increase in the number of states restricting minors' purchase, possession, and use (PPU) of tobacco.
- However, very little work has been done to assess the effect of such laws on adolescent smoking behaviors.

Objectives

- To assess the relationships between state-based PPU laws and smoking prevalence data obtained from a national survey of 8th, 10th and 12 grade students (Monitoring the Future [MTF]).
- These analyses will control for major sociodemographic and tobacco control variables.
- To study the following hypothesis: Any associations of these laws with lower smoking rates would most likely be among younger and lower risk adolescents.

Sources of Data

- **Monitoring the Future Surveys** (8th, 10th & 12th grade students)
 - Conducted by the Institute for Social Research at the University of Michigan
 - Funded by the National Institute on Drug Abuse
 - Independent samples are drawn for each grade; samples are taken within the contiguous United States
 - Data from 1991-1998 were used for this study
 - Sample restricted to minors (determined by state- and year-specific minimum age laws)
 - Unweighted sample size for these analyses = 248,369; 99% of respondents were 13-17 years old.
 - Two adolescent smoking measures were studied: Past Month Smoking (Yes or No) and Past Month Smoking Intensity (none, < 1 cigarette/day, 1-5 cigarettes/day, and \geq 1/2 pack or more/day)

Sources of Data

- **Legislative data: ALA's State Legislated Actions On Tobacco Issues (SLATI) and CDC's State Tobacco Activities Tracking and Evaluation (STATE) systems were used for:**
 - PPU Legislation: The presence of a law prohibiting minors' purchase, possession, or use of cigarettes in each state for 1991-1998 was determined. In addition, a PPU Index was calculated as the sum of the number of laws in each state in a given year (range = 0-3).
 - Clean Indoor Air (CIA) Legislation: Each state was given a rating based on the strength of protection (i.e., none, restricted, restricted with separate ventilation, prohibited) provided in various locations (i.e., private worksites, government worksites, restaurants, retail/grocery stores, malls, sports arenas, child care centers, hospitals, public transit, and hotels/motels) during 1991-1998 with points subtracted for preemption clauses.
 - Sales to Minors Laws: States were classified as 0, 16, 17, 18, or 19 based on the minimum age of legal sales to minors during 1991-1998 (the vast majority of states were at 18 years old).
 - Roswell Park Cancer Institute researchers resolved discrepancies that arose, often by calling state government offices.

Sources of Data

- **Tobacco Control Expenditure Data:** *Compiled by CDC and the Research Triangle Institute*):
 - A composite measure of state-specific expenditures from various sources (e.g., ASSIST, IMPACT, Smokeless States, excise taxes, state funds) during 1991-1998.
- **Price Data:** *The Tax Burden On Tobacco* (State-specific price estimates as of November 1st of each year):
 - Average price for 1991-1998 was constructed by weighting present year and past year prices, and then adding the average to the average of federal and state excise taxes for the current year.

Variables

- Dependent variables (from MTF)
 - Past Month Smoking: yes or no
 - Past Month Smoking Intensity: none, < 1cigarette/day, 1-5 cigarettes/day, and $\geq 1/2$ pack or more/day
- Independent Variables
 - Purchase law (Y/N)
 - Possession Law (Y/N)
 - Use Law (Y/N)
 - PPU Index (sum of the number of laws in each state in a given year; range = 0-3)

Variables

- Control Variables:

- Age, sex, race/ethnicity, father's education, mother's education, respondent's earned income¹, respondent's income from other sources¹, year
- Risk status was determined based on grade point average, truancy, nights out per week, and religious commitment (see paper by An and colleagues – *American Journal of Public Health* 1999;89:609-705) .
- Average price of a pack of cigarettes (including generics) ¹
- Tobacco control expenditures¹
- Minimum age of legal sales to minors
- Clean indoor air index

¹ Dollar estimates were adjusted for inflation

Statistical Analyses

- Tobacco control variables (i.e., price, expenditures, and laws) were merged with the MTF data.
- Dichotomous (for Past Month Smoking) and Ordered (for Past Month Smoking Intensity) Probit analyses were conducted using STATA 7.0 to assess the strength of association of laws with smoking behaviors.
- The cluster option in STATA was used to adjust at the state level – standard errors were corrected for correlation created by having multiple observations within a single state.
- Analyses were conducted on weighted data.
- Coefficients, z-scores, and significance levels were reported.
- Interaction terms for (Age X Use), (Risk X Possess), (Risk X Use), and (Risk X PPU Index) were significant. We therefore ran models for each Age/Risk stratum.

Results

- For both the Past Month Smoking and Past Month Smoking Intensity variables, negative coefficients and z -scores indicate that a law was associated with a lower probability of smoking (see Tables 1-3).
- The presence of a purchase law in a state was inversely associated (borderline significance) with the Past Month Smoking Intensity variable (Table 1). However, no other laws were individually associated with adolescent smoking.
- The PPU Index was inversely associated (marginal or borderline significance) both with Past Month Smoking and with Past Month Smoking Intensity (Table 1).
- In general, controlling for tobacco control variables attenuated slightly the estimates that were obtained before these variables were statistically controlled (Table 1).
- The age/risk analyses indicate that most of the associations were among younger respondents, particularly those at low or medium risk (Tables 2 and 3).

Table 1. Probit Analyses of the Association Between Purchase, Possession, and/or Use Laws and Cigarette Smoking among Minors – United States, 1991-1998

Past Month Smoking				
	Adjusted*		Adjusted**	
	Coefficient (z-score)	p-value	Coefficient (z-score)	p-value
Purchase	-0.047 (-1.14)	0.255	-0.033 (-1.46)	0.145
Possession	-0.037 (-1.30)	0.193	-0.022 (-0.87)	0.383
Use	0.003 (0.11)	0.909	-0.015 (-0.70)	0.482
PPU Index	-0.023 (-1.78)	0.075	-0.018 (-1.65)	0.098
Past Month Smoking Intensity				
	Adjusted*		Adjusted**	
	Coefficient (z-score)	p-value	Coefficient (z-score)	p-value
Purchase	-0.055 (-1.30)	0.193	-0.042 (-1.80)	0.072
Possession	-0.044 (-1.47)	0.141	-0.030 (-1.10)	0.273
Use	0.004 (0.13)	0.899	-0.014 (-0.64)	0.520
PPU Index	-0.027 (-2.06)	0.040	-0.022 (-1.95)	0.052

*Adjusted for demographics and risk; **Adjusted for demographics, risk, and tobacco control variables

Table 2. Probit Analyses of the Association Between Purchase, Possession, and/or Use Laws and Past Month Smoking among Minors, by Age and Risk Group – United States, 1991-1998

Past Month Smoking								
Age/Risk Group	Purchase		Possession		Use		PPU Index	
	z-score	<i>p</i> -value	z-score	<i>p</i> -value	z-score	<i>p</i> -value	z-score	<i>p</i> -value
≤ 14 yrs/Low	-1.81	0.071	-1.97	0.049	-2.13	0.033	-3.38	0.001
≤ 14 yrs/Medium	-0.19	0.848	-2.07	0.039	-3.07	0.002	-2.50	0.012
≤ 14 yrs/High	0.72	0.473	-0.41	0.683	-1.90	0.057	-0.44	0.661
15-16 yrs/Low	-0.62	0.534	-0.34	0.733	-1.93	0.054	-1.23	0.218
15-16 yrs/Medium	-0.43	0.667	0.71	0.478	0.87	0.385	0.58	0.564
15-16 yrs/High	-1.16	0.247	1.16	0.246	2.03	0.043	0.84	0.399
17 yrs/Low	-1.56	0.118	-0.87	0.382	0.58	0.564	-1.06	0.287
17 yrs/Medium	-0.21	0.835	-0.30	0.766	-0.60	0.546	-0.57	0.566
17 yrs/High	-0.65	0.517	0.05	0.958	0.38	0.707	-0.22	0.828

N (Weighted) for each age/risk strata ranges from 9,894 – 62,766

Table 3. Probit Analyses of the Association Between Purchase, Possession, and/or Use Laws and Past Month Smoking Intensity among Minors, by Age and Risk Group – United States, 1991-1998

Past Month Smoking Intensity								
Age/Risk Group	Purchase		Possess		Use		PPU Index	
	z-score	p-value	z-score	p-value	z-score	p-value	z-score	p-value
≤ 14 yrs/Low	-2.13	0.033	-2.30	0.022	-2.13	0.033	-3.94	≤ 0.001
≤ 14 yrs/Medium	-0.13	0.898	-2.05	0.040	-3.24	0.001	-2.60	0.009
≤ 14 yrs/High	0.22	0.822	-1.15	0.252	-2.14	0.033	-1.22	0.221
15-16 yrs/Low	-0.97	0.330	-0.55	0.579	-2.20	0.028	-1.68	0.093
15-16 yrs/Medium	-0.73	0.467	0.38	0.701	0.64	0.520	0.15	0.884
15-16 yrs/High	-1.72	0.085	0.67	0.506	1.94	0.053	0.39	0.698
17 yrs/Low	-1.75	0.081	-1.11	0.268	0.39	0.694	-1.31	0.191
17 yrs/Medium	-0.65	0.517	-0.67	0.505	-0.63	0.528	-1.06	0.289
17 yrs/High	-0.37	0.714	-0.42	0.676	0.08	0.935	-0.40	0.687

N (Weighted) for each age/risk strata ranges from 9,894 – 62,766

Discussion

- Purchase, possession, and use laws are controversial. Many believe that such laws unfairly penalize youths, who've been enticed to smoke by sophisticated marketing practices. Others believe that such laws reinforce personal responsibility and add an extra cost to smoking.
- The results were in the direction we hypothesized. PPU laws were associated with lower smoking rates among those adolescents who themselves were least likely to smoke (as determined by age and risk status).
- These results should be considered preliminary (see Limitations).

Limitations

- Local laws were not measured. Future work will assess the influence of local laws.
- Enforcement was not measured. Future work will assess the influence of enforcement
- The measure of laws prohibiting sales to minors was based only on minimum age. We will incorporate a more sophisticated measure that includes other relevant dimensions (e.g., graduated penalties, requirement for photo identification).