



Supported by
The Robert Wood Johnson Foundation

STUDY OF YOUTH SMOKING AND STATE LAWS PROHIBITING THE PURCHASE, POSSESSION, AND/OR USE OF CIGARETTES BY MINORS – UNITED STATES, 1991-1998

Gary A. Giovino¹, Melanie Wakefield², Frank Chaloupka², Lloyd Johnston³, Patrick O'Malley³, Sandy Slater², Cindy Tworek¹

¹ Department of Cancer Prevention, Epidemiology, and Biostatistics; Roswell Park Cancer Institute

² Health Research and Policy Centers, University of Illinois at Chicago

³ Institute for Social Research, University of Michigan

Society for Prevention Research

9th Annual Meeting

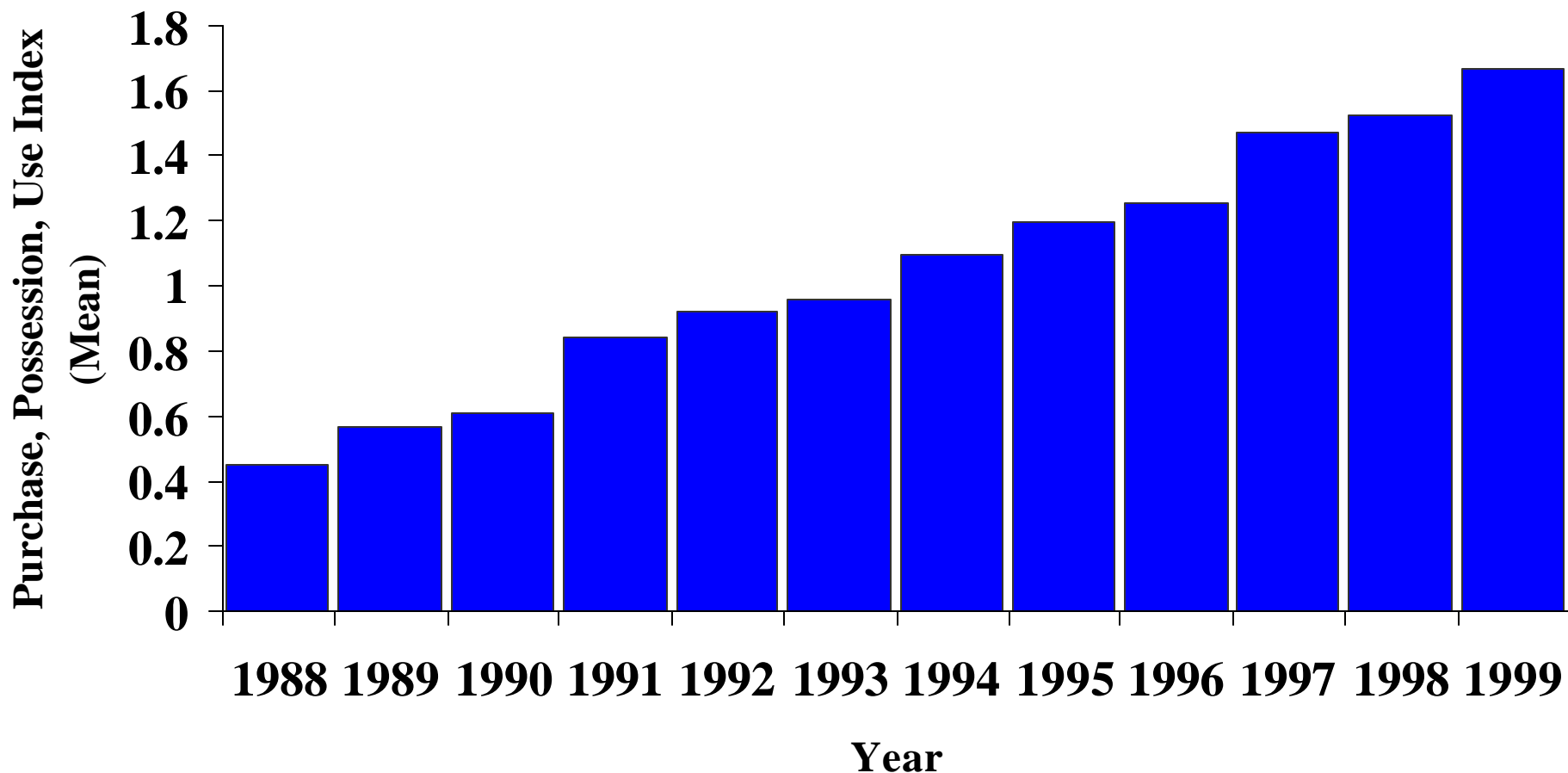
Washington, DC

June 1, 2001

Background:

- ▶▶ 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 these PPU laws on adolescent smoking behaviors.

Mean Number of Purchase, Possession, and Use Laws per State* -- United States, 1988-1999



*Includes the District of Columbia; Note: Theoretical Range = 0-3

Sources: ALA's SLATI, CDC's STATE system, and Roswell Park Cancer Institute.

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]).
- ▶▶ To control for major socio- demographic and tobacco control variables.
- ▶▶ To study the following hypothesis:
Any association of the presence of PPU laws with lower smoking rates would most likely occur 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

Sources of Data:

Monitoring the Future Surveys (8th, 10th & 12th grade students)

- ▶▶ 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*)
 - **Past Month Smoking Intensity** (*none, < 1cigarette/day, 1-5 cigarettes/day, and \geq 1/2 pack/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
- ▶ Clean Indoor Air (CIA) Legislation

NOTE: Roswell Park Cancer Institute researchers resolved discrepancies that arose, often by calling state government offices.

Sources of Data:

Legislative Data

PPU Legislation:

- ▶▶ The presence of a law prohibiting minors' purchase, possession, or use of cigarettes in each state for 1991-1998 was determined.
- ▶▶ A PPU Index was calculated as the sum of the number of laws in each state in a given year (*range = 0-3*).

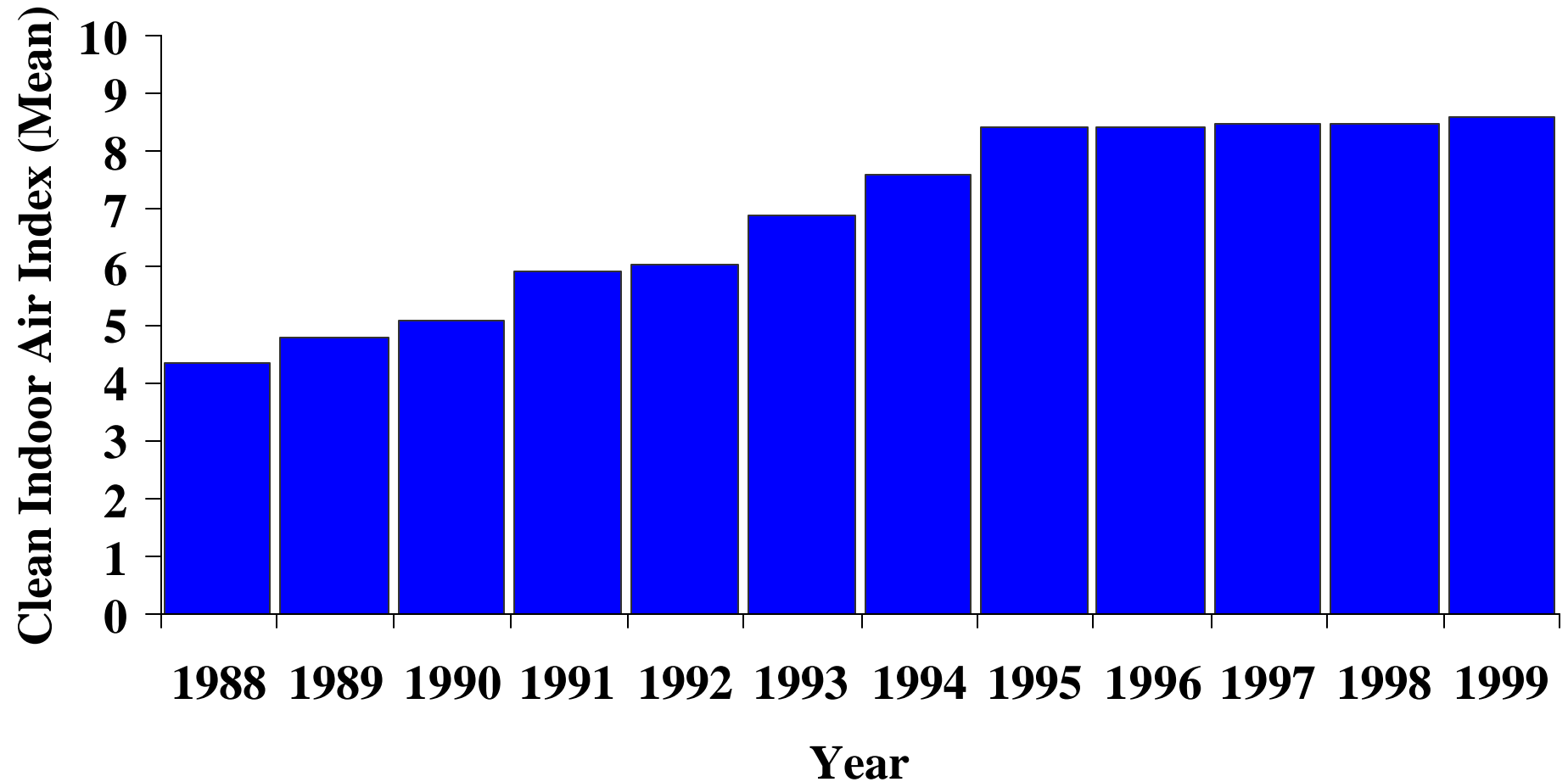
Sources of Data:

Legislative Data

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 during 1991-1998 with points subtracted for preemption clauses.
- ▶ Locations include: private worksites, government worksites, restaurants, retail/grocery stores, malls, sports arenas, child care centers, hospitals, public transit, and hotels/motels.

Mean Clean Indoor Air Law Rating Per State* - - United States, 1988-1999



*Includes the District of Columbia; Theoretical Range = -5-42

Sources: ALA's SLATI, CDC's STATE system, and Roswell Park Cancer Institute

Sources of Data:

Legislative Data

Sales to Minors' (STM) Index:

▶▶ This is an extension of an index previously developed by MaryAnn Alciati and colleagues to assess sales to minors' laws from 1993-1996, based on 9 criteria:

- *Minimum age of purchase*
- *Packaging*
- *Clerk intervention*
- *Photo identification*
- *Vending machine availability*
- *Free distribution*
- *Graduated penalties*
- *Random inspections*
- *Statewide enforcement*

Sources of Data:

Legislative Data

Sales to Minors' (STM) Index:

- ▶▶ Johnathan Gruber and colleagues at MIT expanded this index by adding several categories of criteria and including data from many previous years.
- ▶▶ The STM index used in these analyses was slightly modified from Gruber's work and included the 9 original criteria, plus 2 of Gruber's additional criteria (*advertising restrictions and licensing requirements*).

Sources of Data:

Per Capita Tobacco Control Expenditure Data

Compiled by CDC and the Research Triangle Institute:

- ▶▶ A composite measure of per-capita state-specific tobacco control expenditures from various sources during 1991-1998 (*i.e.*, ASSIST, IMPACT, Smokeless States, excise taxes, state funds)

NOTE: Dollar amounts were adjusted to 1991 dollars.

Sources of Data:

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

NOTE: Dollar amounts were adjusted to 1991 dollars.

Variables:

Dependent Variables (from MTF)

- ▶▶ **Past Month Smoking:** yes or no
- ▶▶ **Past Month Smoking Intensity:** none, < 1 cigarette/ day, 1-5 cigarettes/day, and $\geq 1/2$ pack/day

Independent Variables

- ▶▶ **Purchase Law:** yes or no
- ▶▶ **Possession Law:** yes or no
- ▶▶ **Use Law:** yes or no
- ▶▶ **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 income ¹ ¹
- ▶▶ Respondent's earned income from other sources ¹
- ▶▶ Year (1991-1998)
- ▶▶ Average price of a pack of cigarettes (*including generics*) ¹
- ▶▶ Tobacco control expenditures ¹
- ▶▶ Sales to minors' index
- ▶▶ Clean indoor air index
- ▶▶ Risk status (low, medium, high)

(determined by: grade point average, truancy, nights out per week, and religious commitment – see article by An et al. AJPH 1999; 89: 609-705)

¹ Adjusted to 1991 dollars

Statistical Analyses:

- ▶▶ Tobacco control variables (i.e., price, expenditures, and laws) were merged with the MTF data.
- ▶▶ Dependent variables were dichotomous (for Past Month Smoking) and Ordered (for Past Month Smoking Intensity)
- ▶▶ Logit 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.

Statistical Analyses:

- ▶▶ Analyses were conducted on weighted data.
- ▶▶ Coefficients, z-scores, and significance levels are reported.
- ▶▶ Several 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.

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

Past Month Smoking		
	Adjusted*	
	Coefficient (z-score)	p-value
Purchase	-0.075 (-1.75)	0.080
Possession	-0.050 (-1.11)	0.266
Use	-0.017 (-0.46)	0.642
PPU Index	-0.040 (-2.08)	0.038
Past Month Smoking Intensity		
	Adjusted*	
	Coefficient (z-score)	p-value
Purchase	-0.089 (-1.94)	0.052
Possession	-0.066 (-1.39)	0.166
Use	-0.016 (-0.41)	0.682
PPU Index	-0.048 (2.30)	0.022

*Adjusted for demographics, risk, and tobacco control variables

N (Weighted) = 248,369

Table 2. Logit 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	p-value	z-score	p-value	z-score	p-value	z-score	p-value
≤ 14 yrs/Low	-2.13	0.033	-2.00	0.046	-1.99	0.047	-3.53	<0.001
≤ 14 yrs/Medium	-0.68	0.497	-2.05	0.040	-2.79	0.005	-2.91	0.004
≤ 14 yrs/High	0.15	0.885	-0.22	0.826	-1.52	0.128	-0.58	0.564
15-16 yrs/Low	-0.96	0.336	-0.52	0.602	-1.54	0.124	-1.49	0.137
15-16yrs/Medium	-0.61	0.541	0.89	0.373	0.90	0.366	0.56	0.578
15-16 yrs/High	-1.83	0.068	1.02	0.309	2.10	0.035	0.28	0.777
17 yrs/Low	-2.08	0.038	-1.36	0.174	0.91	0.361	-1.60	0.110
17 yrs/Medium	-0.58	0.559	-0.18	0.859	-0.35	0.725	-0.75	0.452
17 yrs/High	-1.60	0.111	-0.26	0.795	0.64	0.520	-1.23	0.219

Note: Adjusted for demographics and tobacco control variables
 N (Weighted) for each age/risk strata ranges from 9,894 – 62,766

Table 3. Logit 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	-2.20	0.028	-2.13	0.033	-1.98	0.047	-3.64	<0.001
≤ 14 yrs/Medium	-0.61	0.542	-2.15	0.032	-2.94	0.003	-3.03	0.002
≤ 14 yrs/High	-0.31	0.753	-1.23	0.218	-1.74	0.082	-1.51	0.130
15-16 yrs/Low	-1.11	0.268	-0.69	0.492	-1.77	0.077	-1.73	0.084
15-16yrs/Medium	-0.84	0.402	0.58	0.564	0.78	0.435	0.17	0.861
15-16 yrs/High	-2.28	0.023	0.36	0.719	2.00	0.045	-0.30	0.763
17 yrs/Low	-2.18	0.029	-1.50	0.135	0.78	0.434	-1.73	0.084
17 yrs/Medium	-0.97	0.331	-0.61	0.544	-0.45	0.653	-1.29	0.197
17 yrs/High	-1.26	0.209	-1.01	0.313	0.21	0.830	-1.48	0.139

Note: Adjusted for demographics and tobacco control variables
 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.
- ▶▶ **Results were in the hypothesized direction:**
 - PPU laws were generally associated with lower smoking rates among the youngest adolescents at low or medium risk (*i.e those who were least likely to smoke to begin with*).

Discussion:

- ▶▶ **Joint effects deserve further study:**
 - The findings regarding the PPU Index suggest that combinations of laws deserve further study.
 - In future analyses, we will explore the joint effects of each combination of two laws and all three laws.

- ▶▶ **Duration may matter:**
 - In future analyses, we will also include the number of years that a law has been in place, as an independent variable.

Limitations:

- ▶▶ **Local laws were not measured:**
 - Future work will assess the influence of local laws.

- ▶▶ **Enforcement of laws was not measured:**
 - Future work will assess the influence of enforcement.

- ▶▶ **Cross-sectional analyses only depict associations:**
 - Prospective studies are needed to better understand the directions of associations.