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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, < 1 cigarette/day, 1-5 cigarettes/day, and ≥ 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.
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 access 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 ≥ 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
- Respondent’s earned income from other sources
- Average price of a pack of cigarettes (including generics)
- Tobacco control expenditures
- 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

<table>
<thead>
<tr>
<th>Past Month Smoking</th>
<th>Adjusted*</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (z-score)</td>
<td></td>
<td>p-value</td>
</tr>
<tr>
<td>Purchase</td>
<td>-0.075 (-1.75)</td>
<td></td>
<td>0.080</td>
</tr>
<tr>
<td>Possession</td>
<td>-0.050 (-1.11)</td>
<td></td>
<td>0.266</td>
</tr>
<tr>
<td>Use</td>
<td>-0.017 (-0.46)</td>
<td></td>
<td>0.642</td>
</tr>
<tr>
<td>PPU Index</td>
<td>-0.040 (-2.08)</td>
<td></td>
<td>0.038</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Past Month Smoking Intensity</th>
<th>Adjusted*</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (z-score)</td>
<td></td>
<td>p-value</td>
</tr>
<tr>
<td>Purchase</td>
<td>-0.089 (-1.94)</td>
<td></td>
<td>0.052</td>
</tr>
<tr>
<td>Possession</td>
<td>-0.066 (-1.39)</td>
<td></td>
<td>0.166</td>
</tr>
<tr>
<td>Use</td>
<td>-0.016 (-0.41)</td>
<td></td>
<td>0.682</td>
</tr>
<tr>
<td>PPU Index</td>
<td>-0.048 (2.30)</td>
<td></td>
<td>0.022</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Age/Risk Group</th>
<th>Purchase</th>
<th>Possession</th>
<th>Use</th>
<th>PPU Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z-score</td>
<td>p-value</td>
<td>z-score</td>
<td>p-value</td>
</tr>
<tr>
<td>≤ 14 yrs/Low</td>
<td>-2.13</td>
<td>0.033</td>
<td>-2.00</td>
<td>0.046</td>
</tr>
<tr>
<td>≤ 14 yrs/Medium</td>
<td>-0.68</td>
<td>0.497</td>
<td>-2.05</td>
<td>0.040</td>
</tr>
<tr>
<td>≤ 14 yrs/High</td>
<td>0.15</td>
<td>0.885</td>
<td>-0.22</td>
<td>0.826</td>
</tr>
<tr>
<td>15-16 yrs/Low</td>
<td>-0.96</td>
<td>0.336</td>
<td>-0.52</td>
<td>0.602</td>
</tr>
<tr>
<td>15-16 yrs/Medium</td>
<td>-0.61</td>
<td>0.541</td>
<td>0.89</td>
<td>0.373</td>
</tr>
<tr>
<td>15-16 yrs/High</td>
<td>-1.83</td>
<td>0.068</td>
<td>1.02</td>
<td>0.309</td>
</tr>
<tr>
<td>17 yrs/Low</td>
<td>-2.08</td>
<td>0.038</td>
<td>-1.36</td>
<td>0.174</td>
</tr>
<tr>
<td>17 yrs/Medium</td>
<td>-0.58</td>
<td>0.559</td>
<td>-0.18</td>
<td>0.859</td>
</tr>
<tr>
<td>17 yrs/High</td>
<td>-1.60</td>
<td>0.111</td>
<td>-0.26</td>
<td>0.795</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Age/Risk Group</th>
<th>Purchase</th>
<th>Possess</th>
<th>Use</th>
<th>PPU Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z-score</td>
<td>p-value</td>
<td>z-score</td>
<td>p-value</td>
</tr>
<tr>
<td>≤ 14 yrs/Low</td>
<td>-2.20</td>
<td>0.028</td>
<td>-2.13</td>
<td>0.033</td>
</tr>
<tr>
<td>≤ 14 yrs/Medium</td>
<td>-0.61</td>
<td>0.542</td>
<td>-2.15</td>
<td>0.032</td>
</tr>
<tr>
<td>≤ 14 yrs/High</td>
<td>-0.31</td>
<td>0.753</td>
<td>-1.23</td>
<td>0.218</td>
</tr>
<tr>
<td>15-16 yrs/Low</td>
<td>-1.11</td>
<td>0.268</td>
<td>-0.69</td>
<td>0.492</td>
</tr>
<tr>
<td>15-16 yrs/Medium</td>
<td>-0.84</td>
<td>0.402</td>
<td>0.58</td>
<td>0.564</td>
</tr>
<tr>
<td>15-16 yrs/High</td>
<td>-2.28</td>
<td>0.023</td>
<td>0.36</td>
<td>0.719</td>
</tr>
<tr>
<td>17 yrs/Low</td>
<td>-2.18</td>
<td>0.029</td>
<td>-1.50</td>
<td>0.135</td>
</tr>
<tr>
<td>17 yrs/Medium</td>
<td>-0.97</td>
<td>0.331</td>
<td>-0.61</td>
<td>0.544</td>
</tr>
<tr>
<td>17 yrs/High</td>
<td>-1.26</td>
<td>0.209</td>
<td>-1.01</td>
<td>0.313</td>
</tr>
</tbody>
</table>

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.