Interaction of Tobacco 21 and Taxation Policies on Youth Cigarette Smoking Outcomes

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Motivation

• Of adults 25 years or older who smoke cigarettes daily, 90% began smoking before the age of 18

• Most studies separately evaluating T21 and cigarette tax laws find a reduction in youth smoking outcomes

• Although these laws often exist in tandem, no studies have examined whether they jointly have an impact on youth smoking outcomes

Objectives

- To understand the interaction between Tobacco 21 and cigarette tax laws and their association with youth smoking prevalence, initiation, and intentions
- To examine sociodemographic disparities in these associations by sex, race and ethnicity, parental education, and college educational expectations
Study design and sample population

• Monitoring the Future, 2014-2020
  • Nationally-representative of US youth
  • Restricted access
  • Cross-sectional

• Youth and adolescents in 8th, 10th, and 12th grade

Sources: Miech (2023)
Exposures

• T21 laws: Binary, county coverage (100%, <100%)
  • \( \frac{\text{# of individuals covered by local, county, or state law}}{\text{overall county population}} \)

• Cigarette taxes: Continuous 2020 US dollars
  • CDC’s Tax Burden on Tobacco database
  • Combined state and federal tax per pack
  • Gross Domestic Product Implicit Price Deflator

• Primary estimate of interest was their interaction

Sources: Health Equity, Law, & Policy in Epidemiologic Research Tobacco 21 Population Coverage Database (2022); Centers for Disease Control and Prevention Tax Burden database (2021)
# Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Definition</th>
<th>Sample included</th>
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<tbody>
<tr>
<td>Past 30-day smoking</td>
<td>Did vs. did not smoke cigarettes</td>
<td>Full</td>
</tr>
<tr>
<td>First smoking initiation</td>
<td>Smoked first cigarette in the current grade v. never smoked cigarettes</td>
<td>Had not initiated prior to the current grade</td>
</tr>
<tr>
<td>Daily smoking initiation</td>
<td>Started smoking daily in the current grade vs. never smoked daily</td>
<td>Had not initiated daily smoking prior to the current grade</td>
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<tr>
<td>Smoking intention</td>
<td>Intent to smoke in the next 5 years vs. definitely will not smoke</td>
<td>Never smoked</td>
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Sources: Miech (2023)
Sociodemographic factors

- **Sex:**
  - Female, male

- **Race and ethnicity:**
  - NH White, NH Black, Hispanic, another race or ethnicity

- **Parental education:**
  - \( \leq \) high school, some college, \( \geq \) college

- **College educational expectations (Grade 12 only):**
  - Definitely won’t/probably won’t, probably will, definitely will

NH = non-Hispanic

Sources: Miech (2023)
Statistical analysis

- Grade-stratified, modified Poisson regression
  - Triple interactions for sociodemographic factors
  - Adjusted for individual and area-level confounding
    - Individual-level: Household living arrangement, mother’s employment, and high school program
    - Area-level: Census region, smoke-free law coverage, county poverty, county % non-Hispanic Black, county % Hispanic, and county % college grad (25+)

- Sequential regression multiple imputation analysis

Sources: Miech (2023); US Census Bureau’s American Community Survey (5-year estimates); American Nonsmokers’ Rights Foundation Tobacco Control Laws Database
Associations between a $1 increase in cigarette tax in counties with 100% vs. <100% T21 coverage and youth smoking outcomes, MTF, 2014-2020

Among 8th graders, $1 increase in cigarette taxes was associated with a 0.6 percentage point higher probability of smoking participation in counties with 100% vs. <100% T21 coverage. Also, among 8th graders, a $1 increase in cigarette taxes was associated with a 0.4 percentage point higher probability of first cigarette initiation in counties with 100% vs. <100% T21 coverage. There was no association observed in any other smoking outcomes or among 10th and 12th graders.

MTF = Monitoring the Future
No evidence of sociodemographic differences

• In triple interaction models, we found no evidence of differential associations between the interaction of T21 and cigarette tax laws...
  • and any of the youth smoking outcomes we examined
  • by gender, race and ethnicity, parental education, or college-going expectations;
  • further, this pattern was consistent across all grades
• Sensitivity analyses using complete case analyses were consistent with main findings
Conclusions

• We found evidence an interaction between cigarette taxes and county-level T21 coverage for youth smoking participation and first cigarette initiation in 8th graders

• We found no evidence of interactions in any other smoking outcomes or grades

• We also found no evidence of differential associations by sociodemographic factors
## Strengths and limitations

<table>
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<tr>
<th>Strengths</th>
<th>Limitations</th>
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<tr>
<td>Nationally-representative</td>
<td>Cross-sectional</td>
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<tr>
<td>First study to examine the T21/cigarette tax interaction on youth smoking outcomes</td>
<td>Unable to account for local enforcement of T21 laws</td>
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<tr>
<td>Investigated differences across sociodemographic factors</td>
<td>Limited sample size required aggregation of groups underrepresented in the survey</td>
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Implications for future tobacco control policies

• We found limited evidence that higher taxes may be less effective (or less prevalent) in areas with 100% T21 law coverage

• More work is needed to understand…
  • how these policies, and T21 enforcement, may interact particularly since the passage of the federal T21 law and
  • to what extent these policies can be used as tools to reduce racial, ethnic, and socioeconomic disparities in youth smoking
Thank you

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