

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

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# Disclosures

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- The content of this presentation is solely the responsibility of the authors and does not necessarily represent the official views of the NCI or the NIDA of the NIH.
- We have no conflicts of interest to disclose.



• BACKGROUND • METHODS • RESULTS • DISCUSSION

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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

**Sources:** US Department of Health and Human Services; Ando, et al. (2003), Dove (2021), Colston (2022), Wilhelm (2022), Abouk (2021), Schneider (2019), Friedman (2019), Friedman and Wu (2020), Grube (2021), Fleischer (2020), Cavazos-Rehg (2016), Choi (2011), Huang and Chaloupka (2012), Emery (2001), Farrelly (2013), Parks (2020)

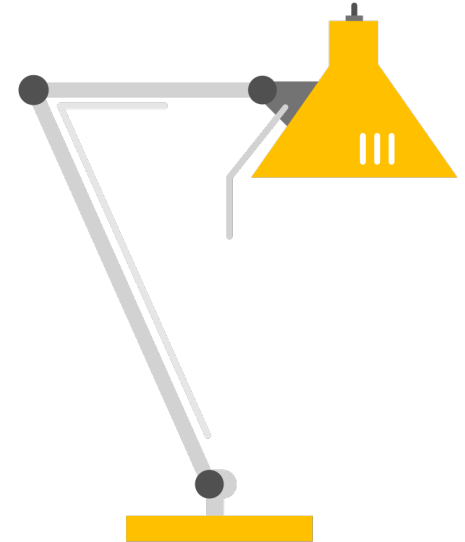
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# Objectives

- 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



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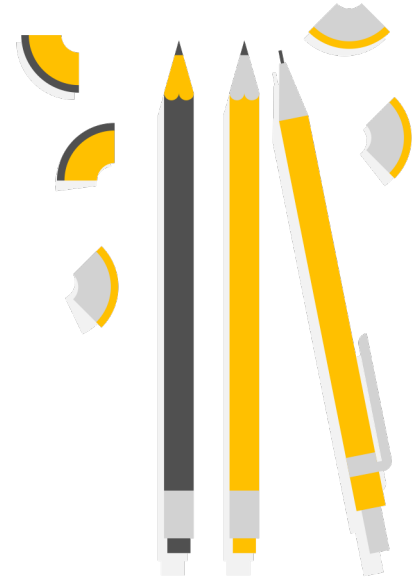
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# Study design and sample population

- Monitoring the Future, 2014-2020
  - Nationally-representative of US youth
  - Restricted access
  - Cross-sectional
- Youth and adolescents in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grade



Sources: Miech (2023)

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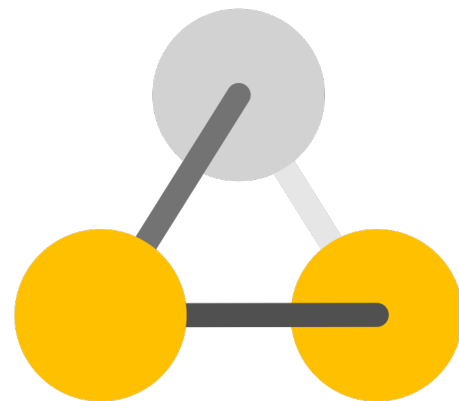
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# Exposures

- 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)

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# Outcomes

Outcome	Definition	Sample included
Past 30-day smoking	Did vs. did not smoke cigarettes	Full
First smoking initiation	Smoked first cigarette in the current grade v. never smoked cigarettes	Had not initiated prior to the current grade
Daily smoking initiation	Started smoking daily in the current grade vs. never smoked daily	Had not initiated daily smoking prior to the current grade
Smoking intention	Intent to smoke in the next 5 years vs. definitely will not smoke	Never smoked

Sources: Miech (2023)

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# 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)

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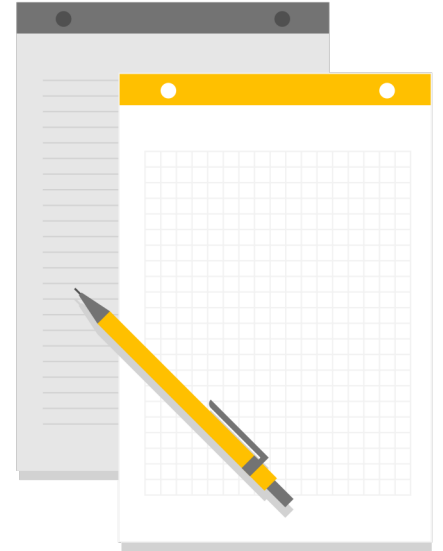


# Statistical analysis

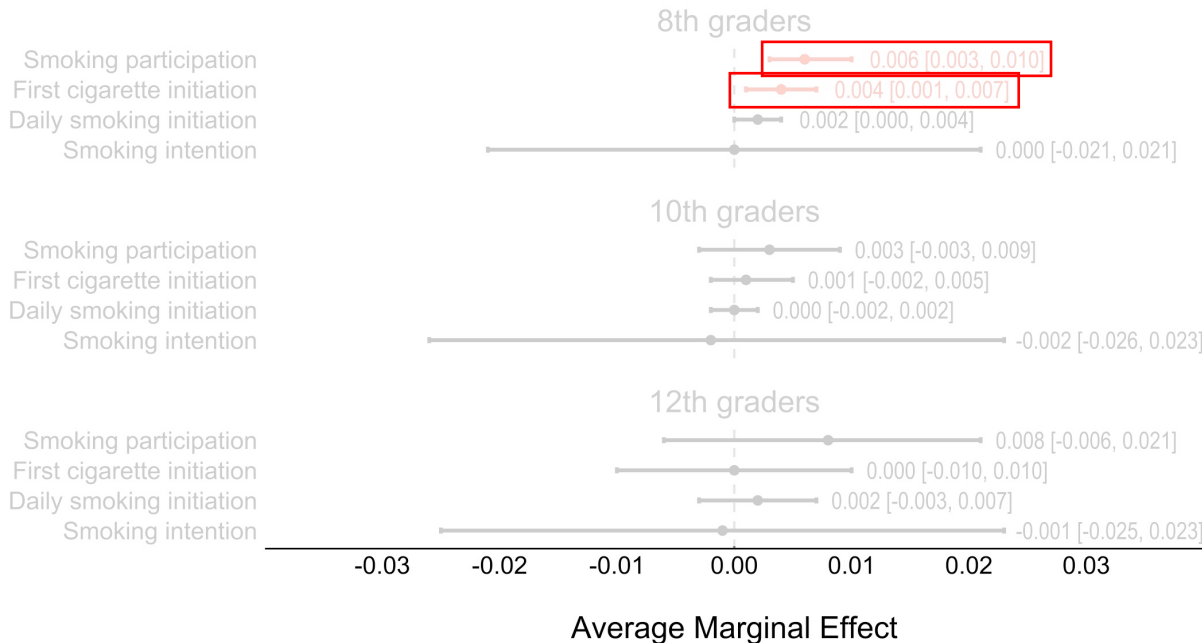
- Grade-stratified, modified Poisson regression
  - Triple interactions for sociodemographic factors
  - Adjusted for individual and area-level confounding
    - Individual-level: Household living arrangement, mother's employment, and high school program
    - Area-level: Census region, smoke-free law 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

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# 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.

There was no association observed in any other smoking outcomes or among 10th and 12th graders.

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.

MTF = Monitoring the Future

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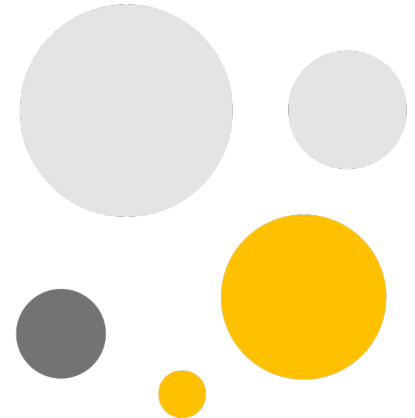
# No evidence of sociodemographic differences

- 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



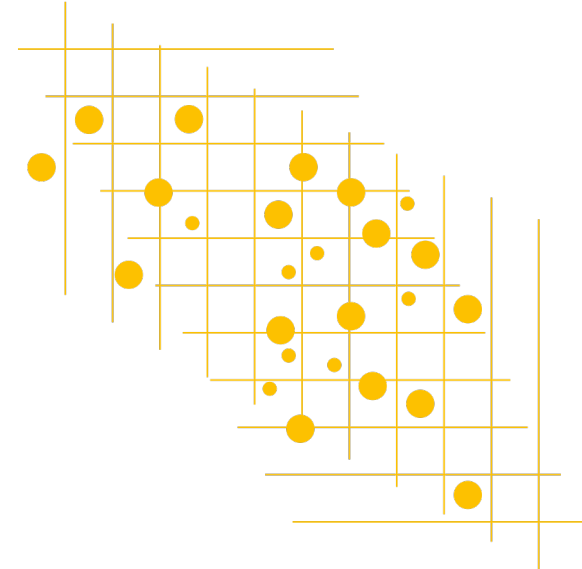
# Conclusions

- We found evidence an interaction between cigarette taxes and county-level T21 coverage for youth smoking participation and first cigarette initiation in 8<sup>th</sup> 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

Strengths	Limitations
Nationally-representative	Cross-sectional
First study to examine the T21/cigarette tax interaction on youth smoking outcomes	Unable to account for local enforcement of T21 laws
Investigated differences across sociodemographic factors	Limited sample size required aggregation of groups underrepresented in the survey



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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



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# Thank you

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