



*A Policy Research Partnership  
to Reduce Youth Substance Use*

**Cigarette Smoking Among Adolescents  
and Adults in 24 U.S. States and the  
District of Columbia in 1997 –  
What Explains the Relationship?**

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## Introduction

In our study of state-specific tobacco-related behaviors, policies, and programs (for Project ImpacTeen), we observed that adolescent smoking and adult smoking prevalences varied directly. This relationship was consistent with the literature on parental smoking as a predictor of adolescent uptake. Additionally, we wondered if tobacco control policies that might influence both adolescent and adult smoking (such as price per pack and clean indoor air policies), would influence this relationship. We hypothesized that the relationship between adolescent and adult smoking would be attenuated, but not eliminated, after controlling for these policy variables.



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## Methods

### Data Sources

- % *Youth Risk Behavior Surveillance System* – state-specific data on major youth risk behaviors are collected bi-annually in surveys (using anonymous self-administered questionnaires) of public high school students (approximate ages 14-18 years<sup>1</sup>. Three adolescent smoking measures were studied: Ever Smoking (even one or two puffs), Past Month Smoking (smoking on  $\geq 1$  of the past 30 days), and Frequent Smoking (smoking on  $\geq 20$  of the past 30 days). In 1997, 24 states and the District of Columbia participated in the survey and provided data that were of sufficient quality that CDC weighted the estimates. Thus, these data are considered representative of all public high school students in each state. (Note that the question on ever smoking was only asked in 22 states and the District of Columbia.)
- % *Behavioral Risk Factor Surveillance System* – state-specific data on major adult (ages  $\geq 18$  years) risk behaviors are collected annually via telephone surveys in all 50 states and the District of Columbia<sup>2</sup>. Data are weighted to represent the adult population of each state. Current smokers are persons who have smoked  $\geq 100$  lifetime cigarettes and who report that they now smoke every day or on some days.
- % *The Tax Burden On Tobacco* – from 1955-1999, the Tobacco Institute annually reported state-specific price estimates as of November 1<sup>st</sup> of each year<sup>3</sup>. The formula for calculating the average price is constructed by giving a weight of 7/12 to the relative proportion price of all sales of cigarettes (generic included) excluding all taxes, as of November 1<sup>st</sup> of the previous year. The data for the average price of a pack of cigarettes for November 1<sup>st</sup> of the current year is given a weight of 5/12, and the weighted average of the two years are added to the average federal and state excise taxes.
- % *1995/96 Current Population Survey* – Data from the National Cancer Institute Supplement to the 1995/1996 Current Population Survey were used to estimate the percent of employed adults working in smoke-free environments<sup>4</sup>. This was used as a proxy measure of statewide protection from environmental tobacco smoke.

### Statistical Analyses

States were selected based on participation in the YRBSS. Simple and multiple linear regression analyses were conducted using SPSS software. First, we regressed adult smoking on adolescent Ever Smoking, Past Month Smoking, and Frequent Smoking. Each set of analyses was conducted overall and by gender, race/ethnicity (African American, White, and Hispanic), and age of the adult (18-24 years, 25-44 years, and 45-64 years). Crude and adjusted (for price and percent of workers who work in smoke-free environments) *beta* coefficients were calculated, along with standard errors of the coefficients and statistical probabilities.

<sup>1</sup> <http://www.cdc.gov/nccdphp/youthris.htm>

<sup>2</sup> <http://www.cdc.gov/nccdphp/brfss>

<sup>3</sup> Orzechowski and Walker. *The Tax Burden on Tobacco. Historical Compilation.* Arlington, Virginia. Volume 34, 1999.

<sup>4</sup> Stillman F, Hartman A, Graubard B, et al. *The American Stop Smoking Intervention Study: Conceptual Framework and Evaluation Design.* Evaluation Review 1999;23:259-280.



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**Table 1: Results of Regression Analyses of Adult Smoking Prevalence on Ever Smoking\*, Past Month Smoking†, and Frequent Smoking‡ among High School Students -- Selected U.S. States and the District of Columbia, 1997¤**

|                           | Characteristic   | N  | Crude  |       |         | Adjusted§ |       |         |
|---------------------------|------------------|----|--------|-------|---------|-----------|-------|---------|
|                           |                  |    | Beta   | SE    | P-value | Beta      | SE    | P-value |
| <b>Ever Smoking‡</b>      |                  |    |        |       |         |           |       |         |
|                           | Overall          | 23 | 1.413  | 0.288 | <0.001  | 0.933     | 0.439 | 0.047   |
|                           | Gender           |    |        |       |         |           |       |         |
|                           | Male             | 23 | 1.334  | 0.252 | <0.001  | 0.883     | 0.404 | 0.042   |
|                           | Female           | 23 | 1.060  | 0.312 | 0.003   | 0.615     | 0.341 | 0.087   |
|                           | Race             |    |        |       |         |           |       |         |
|                           | African American | 12 | 0.174  | 0.221 | 0.45    | -0.012    | 0.237 | 0.961   |
|                           | Hispanic         | 8  | 0.299  | 0.379 | 0.461   | -0.231    | 0.343 | 0.537   |
|                           | White            | 21 | 1.435  | 0.333 | <0.001  | 0.509     | 0.486 | 0.31    |
|                           | Age of Adults    |    |        |       |         |           |       |         |
|                           | 18-24            | 23 | 0.570  | 0.225 | 0.019   | 0.46      | 0.165 | 0.011   |
|                           | 25-44            | 23 | 1.046  | 0.232 | <0.001  | 0.591     | 0.352 | 0.109   |
|                           | 45-64            | 23 | 0.91   | 0.252 | 0.002   | 0.333     | 0.393 | 0.407   |
| <b>Past Month Smoking</b> |                  |    |        |       |         |           |       |         |
|                           | Overall          | 25 | 1.370  | 0.242 | <0.001  | 1.198     | 0.381 | 0.005   |
|                           | Gender           |    |        |       |         |           |       |         |
|                           | Male             | 25 | 1.331  | 0.221 | <0.001  | 0.953     | 0.335 | 0.01    |
|                           | Female           | 25 | 1.067  | 0.26  | <0.001  | 0.914     | 0.332 | 0.012   |
|                           | Race             |    |        |       |         |           |       |         |
|                           | African American | 11 | -0.177 | 0.223 | 0.448   | -0.266    | 0.241 | 0.306   |
|                           | Hispanic         | 7  | 0.735  | 0.454 | 0.167   | 0.104     | 0.391 | 0.807   |
|                           | White            | 23 | 1.306  | 0.261 | <0.001  | 0.796     | 0.417 | 0.072   |
|                           | Age of Adults    |    |        |       |         |           |       |         |
|                           | 18-24            | 25 | 0.732  | 0.164 | <0.001  | 0.655     | 0.116 | <0.001  |
|                           | 25-44            | 25 | 1.077  | 0.181 | <0.001  | 1.002     | 0.283 | 0.002   |
|                           | 45-64            | 25 | 0.825  | 0.224 | 0.001   | 0.392     | 0.366 | 0.297   |
| <b>Frequent Smoking</b>   |                  |    |        |       |         |           |       |         |
|                           | Overall          | 25 | 0.940  | 0.177 | <0.001  | 1.001     | 0.279 | 0.002   |
|                           | Gender           |    |        |       |         |           |       |         |
|                           | Male             | 25 | 0.816  | 0.163 | <0.001  | 0.792     | 0.261 | 0.006   |
|                           | Female           | 25 | 0.809  | 0.186 | <0.001  | 0.742     | 0.239 | 0.005   |
|                           | Race             |    |        |       |         |           |       |         |
|                           | African American | 25 | 0.045  | 0.094 | 0.646   | 0.07      | 0.108 | 0.541   |
|                           | Hispanic         | 25 | 0.254  | 0.395 | 0.54    | -0.351    | 0.252 | 0.258   |
|                           | White            | 25 | 0.890  | 0.177 | <0.001  | 0.584     | 0.286 | 0.055   |
|                           | Age of Adults    |    |        |       |         |           |       |         |
|                           | 18-24            | 25 | 0.570  | 0.103 | <0.001  | 0.526     | 0.082 | <0.001  |
|                           | 25-44            | 25 | 0.735  | 0.133 | <0.001  | 0.821     | 0.208 | 0.001   |
|                           | 45-64            | 25 | 0.535  | 0.165 | 0.004   | 0.344     | 0.278 | 0.23    |

Source: 1997 Youth Risk Behavior Surveillance System, for High School Student Prevalence Data; 1997 Behavioral Risk Factor Surveillance System, for Adult Smoking Prevalence Data; 1999 The Tax Burden On Tobacco, for 1997 Cigarette Price Data; 1995/1996 Current Population Survey National Cancer Institute Tobacco Use Supplement Public Use Data Tapes, for the percentage of Employed Adults Who Work in Smokefree Environments.

§Adjusted for the average price of a pack of cigarettes in 1997, and the percentage of employed adults who work in smokefree environments.

\*Ever tried cigarette smoking, even one or two puffs.

†Smoked on greater than or equal to 1 day during the previous 30 days

‡Smoked on greater than or equal to 20 days during the previous 30 days.

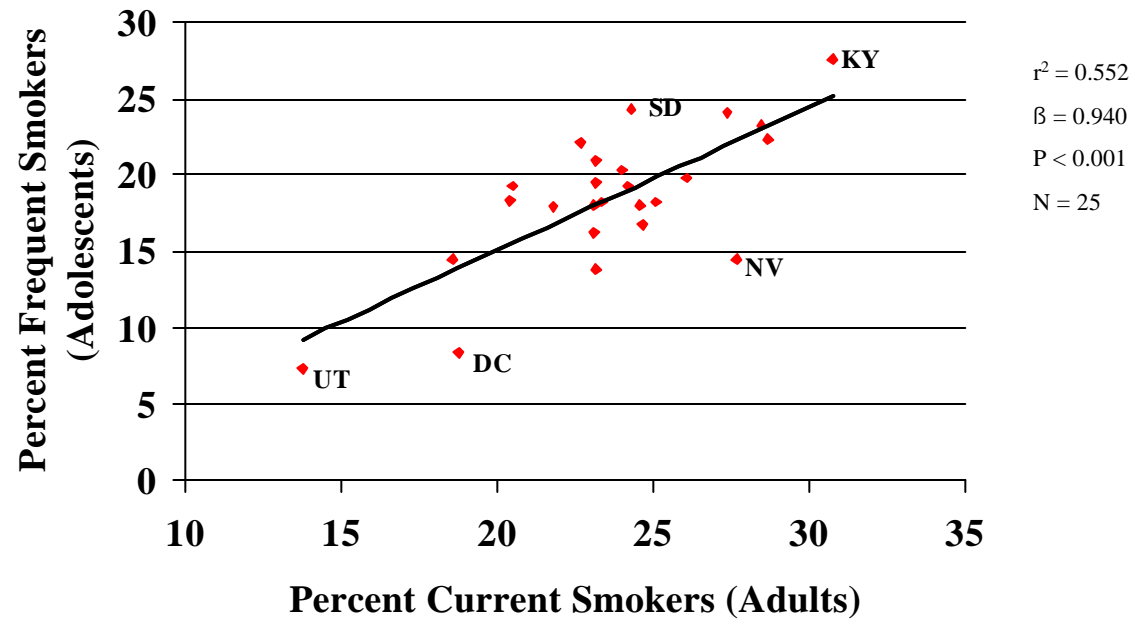
¤Alabama, Arkansas, Connecticut, District of Columbia, Hawaii, Iowa, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Missouri, Montana, Nevada, New York, Ohio, Rhode Island, South Carolina, South Dakota, Utah, Vermont, West Virginia, Wisconsin, Wyoming.

£Maine and Wisconsin did not ask questions regarding Ever Smoking in High School Students.



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## Cigarette Smoking among youth and adults in 24 states and the District of Columbia, 1997.



Sources: 1997 Youth Risk Behavior Survey (14-18 year old public school students)  
 1997 Behavioral Risk Factor Survey (adults 18+ years old)

Note: Frequent Smoking among youth = smoking on  $\geq 20$  days during the previous 30 days  
 Adult current smoking = smoking every day or on some days



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## Discussion

The crude relationships between adult smoking prevalence and adolescent smoking behaviors were direct and statistically significant for every category studied with the exception of African Americans and Hispanics. Overall, significant crude relationships were generally attenuated and remained significant for each adolescent smoking behavior. In addition, the significant crude relationships remained significant in 10 of 18 gender, race, and age categories assessed and were of borderline significance in three others.

The findings for African Americans and Hispanics are likely influenced by the small number of states for which data were available. In addition, the prevalence of smoking among African American adolescents decreased substantially in the 1970s and 1980 in a manner substantially different from that of whites.

Since the relationships persisted after control for the two most important policy variables, the findings of this study are consistent with the notion that adult smoking directly influences adolescent smoking. However, other potential explanatory variables (e.g., the presence of strong tobacco control programs, relationship quality between parents and adults) cannot be ruled out by this analysis. For example, recent reports suggest that states with strong tobacco control programs have made progress (in terms of either reducing smoking prevalence or slowing the rate of increase) with both adults and adolescents<sup>5,6</sup>. The number of states with strong tobacco control programs who participated in the 1997 YRBSS was too small for our analysis. Future analyses will incorporate this variable when possible. We will also explore the potential influencing role of income disparity.

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<sup>5</sup> Centers for Disease Control and Prevention. Best Practices for Comprehensive Tobacco Control Programs – August 1999. Atlanta GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, August 1999.

<sup>6</sup> Wakefield MA, Chaloupka FJ. Effectiveness of Comprehensive Tobacco Control Programs in Reducing Smoking in the United States. *Tobacco Control* 2000;9:177-186.



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## Results

The crude relationship between adolescent Ever Smoking and adult smoking prevalence was direct and significant overall, and for males, females, whites, and persons of all age categories. The adjusted relationships were attenuated and remained significant overall, and for males and adults 18-24 years old. The adjusted relationship among females was of borderline significance.

The crude relationship between adolescent Past Month Smoking and adult smoking prevalence was direct and significant overall and for males, females, whites, and persons of all age categories. The adjusted relationships were attenuated and remained significant overall, and for males, females, 18-24 year old adults, and 25-44 year old adults. The adjusted relationship among whites was of borderline significance.

The crude relationship between adolescent Frequent Smoking and adult smoking prevalence was direct and significant overall, and for males, females, whites, and persons of all age categories. The adjusted relationships were, in general, attenuated and remained significant overall, for males, females, 18-24 year old adults, and 25-44 year old adults. The adjusted relationship among whites was of borderline significance.

**ImpacTeen**

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