

# Do seat belts explain socioeconomic differences in traffic accident mortality?

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## Objectives

- 1 Estimate the impact of seat belt use on motor vehicle accident (MVA) mortality by education.
- 2 Estimate the contribution of seat belt use to MVA mortality inequalities.

## Background

- Strong social inequalities in MVA mortality:

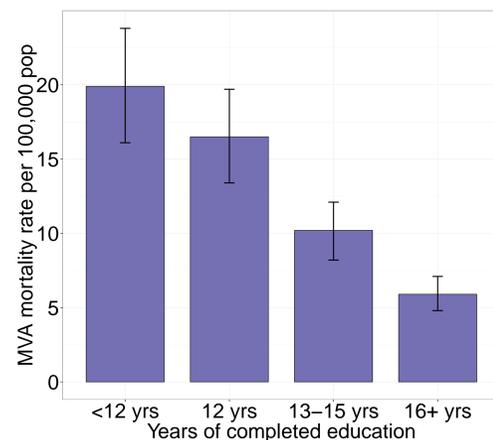


Figure 1: MVA mortality by education, 2010

- Seat belts reduce MVA mortality [1].
- Mandatory seat belt laws increase seat belt use more among the lower educated [2]:

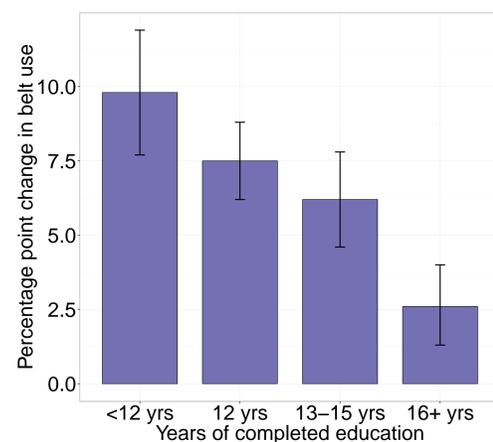
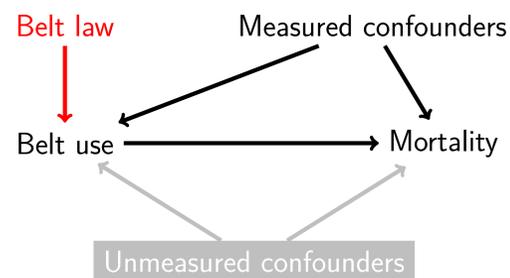


Figure 2: Effect of mandatory law on seat belt use

## Design: Instrumental Variables

- Main problem is endogeneity of seat belt use.
- We used mandatory seat belt law changes among 46 states between 1994 and 2010 to instrument for seat belt use:



## Statistical Methods

- Two-stage least squares (2SLS), by education.
- First stage: law  $\rightsquigarrow$  belt use.
- Second stage: predicted belt use  $\rightsquigarrow$  MVA.

$$B_{jst} = \alpha + \beta_{jst}L_{jst} + \gamma_{jst}Z_{jst} + \delta_s + \theta_t + \epsilon \quad (1)$$

$$MVA_{jst} = \alpha + \rho_{jst}\hat{B}_{jst} + \gamma_{jst}Z_{jst} + \delta_s + \theta_t + \epsilon \quad (2)$$

$j$  indexes education groups  
 $s, t$  index states and years, respectively  
 $B$  = seat belt use  
 $L$  = presence of mandatory seat belt law  
 $Z$  = age, gender, race, other policies

## Assumptions & Limitations

- Validity of self-reported seat belt use.
- No direct effect of laws on mortality.
- No common causes of laws and mortality.

Education	First stage* $F$ -statistic
<12 years	7.5 26.4
12 years	5.4 30.8
13-15 years	3.9 26.3
16+ years	1.4 1.7

Table 1: IV diagnostics (\*pct points belt use)

## Conclusion

Eliminating the current 10 point difference in seat belt use between the lowest and highest education groups would reduce the education difference in MVA mortality rates by about **17%**.

## References

- [1] Cohen A, Einav L. The effects of mandatory seat belt laws on driving behavior and traffic fatalities. *Rev Econ Stat* 2003;85(4):828-43.
- [2] Harper S, Strumpf EC, et al. The effect of mandatory seat belt laws on seat belt use by socioeconomic position. *J Policy Anal Manag* 2014:141-61.

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## Bottom Line

Factors other than seat belt use, such as driving behavior and car safety, may be more important contributors to socioeconomic differences in traffic accident mortality.

## Data (1994-2010)

Mortality rates and behaviors:

- US Vital Statistics (MVA mortality)
- Current Population Survey (rate denominators)
- US Behavioral Risk Factor Surveillance Surveys
  - Belt use by education
  - Demographic covariates (age, sex, race)

Policy data:

- NHTSA for policy changes (24 states upgraded from secondary to primary enforcement).
- Potential confounders of policy changes and mortality:
  - Vehicle miles traveled
  - Speed limit changes
  - Drunk driving law changes

## Results

- 1 point increase in belt use reduced MVA death rate by 0.25/100,000 among lowest educated.
- Generally null for higher educated.

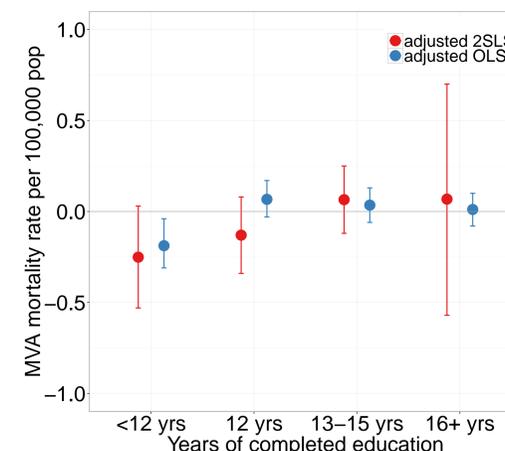


Figure 3: Effect of belt use on MVA mortality