

Alcohol-Induced Deaths & the Minimum Legal Drinking Age

Jeffrey DeSimone, University of Alabama at Birmingham

Summary

- Using RD on annual 2007–2015 U.S. averages & age in years, I estimate how reaching the MLDA affects alcohol-induced mortality, for which a death certificate ICD-10 code reflects alcohol as a direct cause.
- At age 21, the alcohol-induced death rate jumps by 30–50%, simultaneously with large alcohol use increases. Estimates from 1999–2006 are similar, closely replicating prior findings using age in days.

Introduction

- In 2008, two decades after the last U.S. state raised it to 21, the MLDA received renewed attention when the Amethyst Initiative (college & university presidents) argued that if legal, drinking among 18–20 year-olds would be less dangerous.
- However, using data on age in days among 19–22 year-olds, Carpenter & Dobkin (2009 & 2011, CD) convincingly showed that mortality rates, particularly from external causes such as suicide and motor vehicle accidents (MVAs), spike upward just after the 21st birthday.
- I focus on CD's "deaths with a mention of alcohol," i.e. with a death certificate ICD-10 code reflecting a MCD categorized by CDC as a direct result of excessive drinking: most relevant for this age group are alcohol poisoning, alcoholic psychosis, alcohol abuse/dependence, and high BAC.

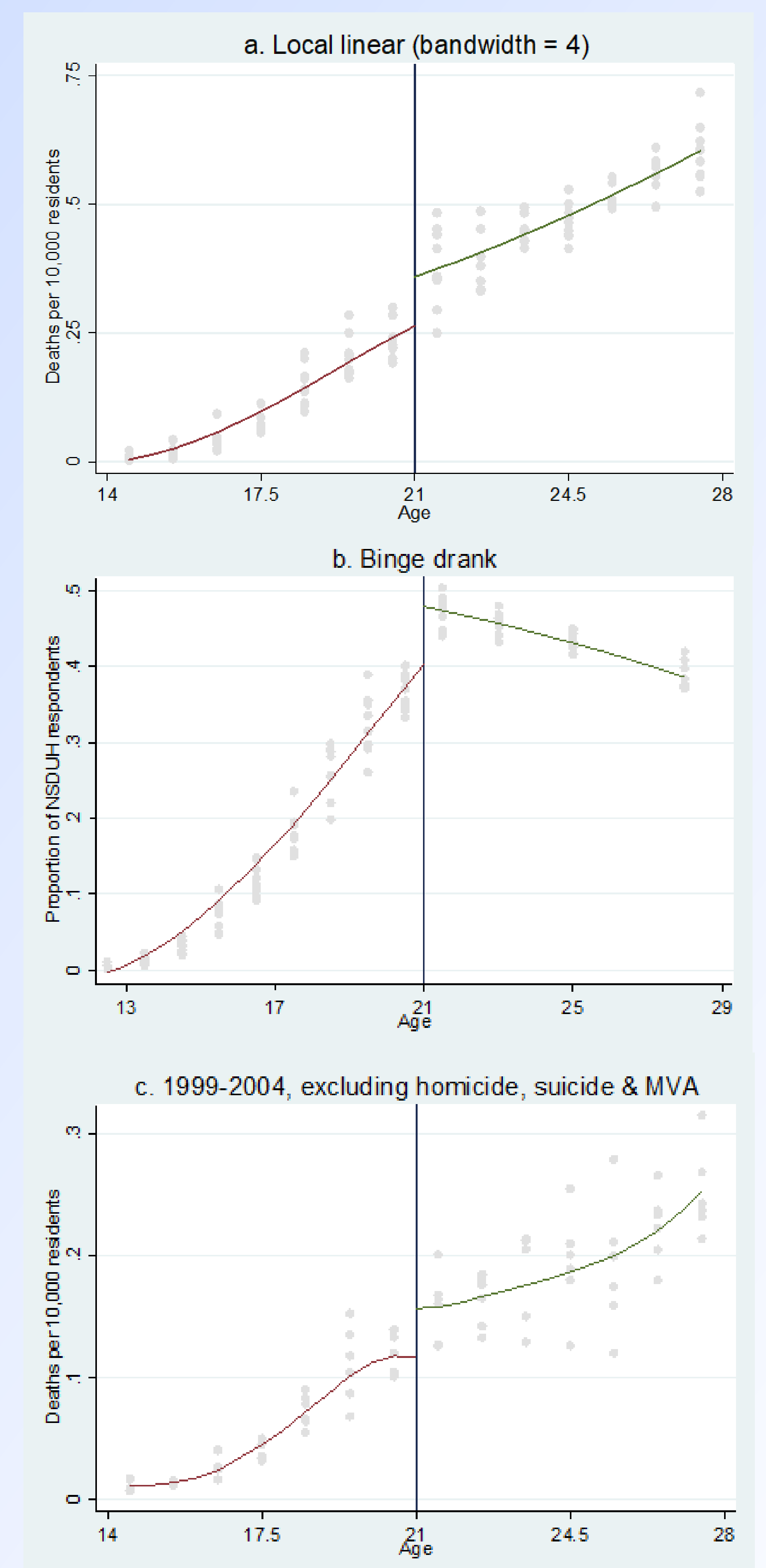
Empirical Strategy

- I use death rates by year of age, which are commonly available in publicly accessible data: my sample includes ages 14–27.
- I compare LLR estimates with those from OLS using a 5th-order age polynomial.
- To address rounding bias, I estimate LQRs, plus OLS using separate cubics to allow a correction based on Dong (2015).
- My sample period begins upon ICD-10 code F10.0 discontinuation in 2007, while CD analyzed 1997–2004.
- I study all alcohol-induced deaths, while CD removed (& studied separately) those with UCD of suicide or MVA.

Results

- The main result is that the alcohol-induced death rate increases sharply & significantly at age 21 (figure a.), for LLRs using various bandwidths/kernels & OLS regardless of bias correction or logging deaths.
 - Mirroring CD, the effect size is 30–50% of the predicted age 21 death rate.
- In 2007–2015 NSDUH age-by-year data, drinking rises discontinuously at age 21 (figure b.), corroborating existing evidence but for my sample period/aggregation level.
 - Past month alcohol use, binge drinking & binge days each jump by 20% at age 21.
- Restricting the sample to deaths in 1999–2004 not attributable to suicide, MVA or homicide (mimicking CD, except ICD-10 coding began in 1999) yields bias-corrected estimates of 30–45%, closely replicating their findings (figure c.).
- Falsification exercises suggest that the RD effect significance is not attributable merely to using less-specific age information.
 - Effects are not consistently large or significant at any other age from 17–25.
 - Age-specific population increases at the MLDA are always highly insignificant & typically below 0.5%.
 - Excluding suicide & MVA (which CD found respond to the MLDA), the age 21 increase is significant (at only 10%) for just 1 of the next 12 leading UCDs among ages 14–27 (those with > 2,000 sample period mentions among this cohort).
- Decomposing by UCD, 40% of the effect is attributable to MVAs (21% of mentions), 20% each to alcohol-induced (19% of mentions) & causes other than alcohol, drugs, MVA or suicide (13% of mentions).
 - Age 21 increases are insignificant for drug-induced causes (39% of mentions) & suicide (8% of mentions).
 - Effects are small & insignificant for deaths with no alcohol mention.
- CD found significant MLDA effects on...
 - MVA, but mine is insignificant b/c the SE spiked during the financial crisis; significance is very high since 2010.
 - Suicide, but this discontinuity has decreased substantially since the crisis & was driven all along by an effect on gun suicides, which remains significant.
- Effects are generally large & significant across subsamples defined in various ways, but are proportionately largest among non-Hispanic whites, outside MSAs, for poisoning & during the crisis.

Figures



Conclusion

- Consistent with CD but contradicting the Amethyst Initiative's claims, the results imply that a MLDA of 21 rather than 18 saved an average of at least 79 lives annually over the sample period.
- Adjusting the EPA's statistical value of life to 2016 terms (and fully allocating to ages 18+) implies a corresponding minimum savings of nearly \$800 million per year.

References

- Carpenter & Dobkin, "The Effect of Alcohol Consumption on Mortality: Regression Discontinuity Evidence from the Minimum Drinking Age," *AEJ: Applied Economics*, January 2009, 164–182.
- Carpenter & Dobkin, "The Minimum Legal Drinking Age and Public Health," *J Econ Perspectives*, Spring 2011, 133–156.
- Dong, "RD Applications with Rounding Errors in the Running Variable," *J Applied Econometrics*, April/May 2015, 422–446.