

Title:

Age of Drinking Onset, Driving After Drinking, and Involvement in Alcohol Related Motor Vehicle Crashes

Author(s):

Hingson, R., Heeren, T., Levenson, S., Jamanka, A., Voas, R

Affiliation:

Boston University School of Public Health, Boston

Presenting author's address:

715 Albany Street TW2, Boston, MA 02118

Keywords:

Alcohol; drinking onset, driving after drinking, motor vehicle crashes

Body of paper:

Abstract

Objectives. To assess whether earlier drinking onset relates to drunk driving and alcohol related crash involvement over the life course.

Methods. A national survey asked 42,862 respondents the age they started drinking, whether they drove after drinking too much, and were in motor vehicle accidents because of their drinking.

Results. The earlier the age respondents started drinking, the more likely they were to report driving after drinking too much and being in a motor vehicle crash because of their drinking even after adjusting for current/ever diagnosis of alcohol dependence and other characteristics and behaviors associated with the age respondents started drinking.

Conclusion. Traffic safety benefits of delaying drinking may extend well beyond the legal drinking age of 21.

Introduction: Traffic crashes are the leading cause of death in the U.S. between ages 1 – 24 and 39% of fatal crashes are alcohol related.¹ In 1998, 15,935 persons died in alcohol related crashes and at least 300,000 were injured.²

To reduce alcohol related fatal crashes among youth, all states have adopted a minimum legal drinking age (MLDA) of 21. States adopting MLDA of 21 in the early 1980s experienced a 10 – 15% decline in alcohol related traffic deaths among drivers in the targeted ages compared with states that did not adopt such laws.³ The National Highway Traffic Safety Administration has estimated that the MLDA of 21 prevents 700-1000 traffic deaths annually among persons under 21, and over 18,000 traffic deaths among persons under 21 have been prevented since 1975.⁴

MLDA laws not only decreased drinking among persons under age 21, they also lowered drinking among people age 21 to 25 who grew up in states with MLDA of 21 relative to those who grew up in other states.⁵ However, it is not known whether these laws and other efforts to reduce underage drinking, lower driving after drinking, and alcohol related motor vehicle crash involvement later in life.

A recent analysis of the National Longitudinal Alcohol Epidemiologic Survey (NLAES) found that persons who began drinking regularly before age 14 compared to those who started at age 21 or older were three times more likely to develop diagnosable alcohol dependence during their life⁶. Questions in that survey permit us to explore whether age of drinking onset is similarly related to whether respondents, ever in their life, and specifically during the year prior to the survey have

- driven a motor vehicle after having too much to drink; and
- been in a motor vehicle crash because of their drinking.

independent of factors such as alcohol dependence that are related to early age of drinking onset.

Materials and Methods: The National Longitudinal Alcohol Epidemiologic Survey (NLAES) conducted in person interviews with 42,862 respondents age 18 and older in the contiguous United States in 1992, mean age 44. The multi-stage sampling design was described by Massey.⁷ The survey household response rate was 91.9 percent and the person response rate was 97.4 percent. Fieldwork was conducted by the Bureau of the Census. To provide a representative sample of the U.S. adult population, weighting using SUDAAN adjusted for deliberate oversampling of Blacks and persons under 29⁸.

Outcome measures Driving after drinking was explored by asking respondents, “In your entire life, did you ever drive a car, motorcycle, truck or boat, or other vehicle after having too much to drink? Did that happen in the past 12 months?” Alcohol related crash involvement was explored by asking respondents, “In your entire life, did you ever have a car, motorcycle, truck, boat, or other accident because of your drinking? Did that happen in the past 12 months?”

Independent variables Age of drinking onset was determined by asking respondents, “About how old were you when you first started drinking, not counting small tastes or sips of alcohol?” For analysis, age of drinking onset was categorized as under 14, each year separately from 14 through 20, and 21 or older.

The following demographic and behavior variables were examined as potential confounders of the association between age of drinking onset and later behavior: current age, sex, race/ethnicity (white non-hispanic, black non-hispanic, hispanic, other), education, marital status, smoking status (current, former, never), illicit drug use status (current, former, never) and alcohol dependency (current, former, never). Alcohol dependency was determined along DSM-IV guidelines through the AUDADIS structured diagnostic interview.⁶

Statistical Analysis All statistical analyses were conducted using the SUDAAN statistical package to account for the complex survey design and oversampling of NLAES in the estimation of both effects and their standard errors. We focused on respondents who reported drinking ever in their lifetime (n=27,081). The univariate associations between age of drinking onset and drinking and driving outcomes and demographic and background behavior characteristics was tested using a modified chi square analysis that adjusts for the sampling design. Logistic regression explored whether age of drinking onset was associated with each of the drinking and driving outcomes, controlling for potential confounding from demographic and behavior characteristics including alcohol dependency. The overall significance of the relations between different ages of drinking onset and study outcomes in the logistic models were tested through a chi-square statistic comparing models with and without the set of indicator variables representing age of onset. We examined whether the potential association between age of drinking onset and drinking and driving outcomes persisted after controlling for alcohol dependence because of the established relationships between alcohol dependence and drinking and driving and between age of drinking onset and alcohol dependency.⁸ We also examined the potential relationships between age of drinking onset and drinking and driving behavior in the subset of respondents who were never alcohol dependent (n=21,713).

Results: Sixty-five percent of respondents ever drank alcohol, 49% before age 21 and 3% before age 14. The mean drinking onset age was 19.0 years. Four percent were classified as alcohol dependent in the past year and 13% ever in their life.

Twenty-three percent of respondents reported driving a motor vehicle after having too much to drink ever in their life and five percent in the past year. Four percent of respondents reported ever having been in a motor vehicle crash because of their drinking, 0.2% in the past year. The earlier the age respondents began drinking, the greater the proportions who reported driving after drinking too much and motor vehicle crash involvement because of drinking ever in their lives and during the year prior to the survey. (Figures 1 and 2)

Male respondents, younger respondents, those with less than a high school education, persons never married, and persons who currently or ever smoked or used illicit drugs and respondents with a current (past year) or lifetime diagnoses of alcohol dependence were significantly more likely to have begun drinking at earlier ages (all relations $p < .001$; data available upon request).

To control for these potentially confounding characteristics, we entered each of those background characteristics into a series of multiple logistic regression analyses examining the following outcomes as dichotomous variables: whether or not respondents drove after drinking too much, or were in a motor vehicle accident because of their drinking. Each of these outcomes was examined ever during the respondent's life and during the year prior to the interview.

Respondents who began drinking at an earlier age were significantly more likely to report that they drove after drinking too much ever and in the past year. Further, they were significantly more likely to have ever been involved in a motor vehicle accident after drinking too much. For each study outcome, the odds ratio and 95% confidence intervals for respondents who began drinking each year from less than age 14 through 20 relative to those who began at age 21 or older was examined separately. Results are summarized in Figures 3 and 4.

The strongest relationships were observed when comparing respondents who started drinking at age 14 relative to those starting at age 21 and older. Persons who began drinking when they were age 14 were 3.36 (95% CI 2.66, 4.25) times more likely than those who began after age 21 to report ever driving after drinking too much and 2.33 (1.68, 3.23) times more likely to do so in the year prior to the survey. Further, they were 4.1 times more likely to report being in a motor vehicle crash after drinking too much ever (95% CI 2.87, 5.85) and in the past year (95% CI 1.52, 10.91). As can be seen in the figures, these relationships tended to weaken as the age of drinking onset became closer to age 21. Nonetheless, respondents who began drinking in each age group under 21 relative to those starting after age 21 were significantly more likely to report ever driving after drinking too much and ever being in a motor vehicle crash after drinking too much.

We also repeated the logistic regression analysis examining only the subgroup of respondents who drank but never experienced alcohol dependence ($n=21,462$). Just over half the sample, this group represented 35% of those who reported motor vehicle crashes after too much drinking ever during their life and 28% of those reporting such crashes in the year prior to the interview. Those who started drinking in each age group under 21 were significantly more likely than those who started drinking after age 21 to have ever and in the past year been in a motor vehicle crash after drinking too much. Data available upon request.

Discussion: Previous studies have shown that raising the legal drinking age to 21 reduced drinking and alcohol related motor vehicle crash involvement among persons under age 21.^{5,6} Prior research also indicated that persons who were living in states with a legal drinking age of 21 not only drank less when they were under age 21, but also when they were age 21 to 25.⁶ This study found that the earlier the age respondents started drinking, the more likely

they were to report driving after drinking too much ever in their life and in the past year. Also the earlier the age of drinking onset, the greater the likelihood the respondents reported being in a motor vehicle crash because of their drinking even after we analytically controlled for characteristics and behaviors associated with earlier drinking onset: whether or not respondents ever or currently had an alcohol dependence diagnosis, age, gender, education, race/ethnicity, marital status, smoking, or illicit drug use. A 4-fold increased alcohol related crash risk for those who began drinking at age 14 relative to those who started after age 21 was found ever in a respondent's life and during the year of the survey suggesting the relationship may not be purely a function of having a longer period of alcohol exposure.

It is possible that people who engage in a variety of deviant or illegal behaviors at an early age are more likely to engage in several such behaviors later in life. Also, these results were based on self-report in a cross-sectional survey, not in a prospective study following respondents from the time of drinking onset. However, questions were worded in a way that suggests the relation may be even stronger than reported. Persons who drive after drinking tend to believe that they can consume more drinks and still drive safely than people who do not drive after drinking.⁹ Consequently, they may underreport the actual frequency with which they drove after drinking too much or were in a crash because of their drinking.

A recent report indicated that after a decade of decline, the percentage of high school seniors who drink and drive has increased the last two years.¹⁰ The study reported here identifies another important reason to step up enforcement of the legal drinking age of 21 and to expand educational programs that delay the onset of drinking. The potential traffic safety benefits of delaying underage drinking may extend well beyond age 21.

Acknowledgements The National Longitudinal Alcohol Epidemiology Study (NLAES) was sponsored by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). We would like to thank Dr. Bridgett Grant at NIAAA for her help on this project.

Figure 1: Drove After Drinking Too Much According to Age of Drinking Onset (NLAES)

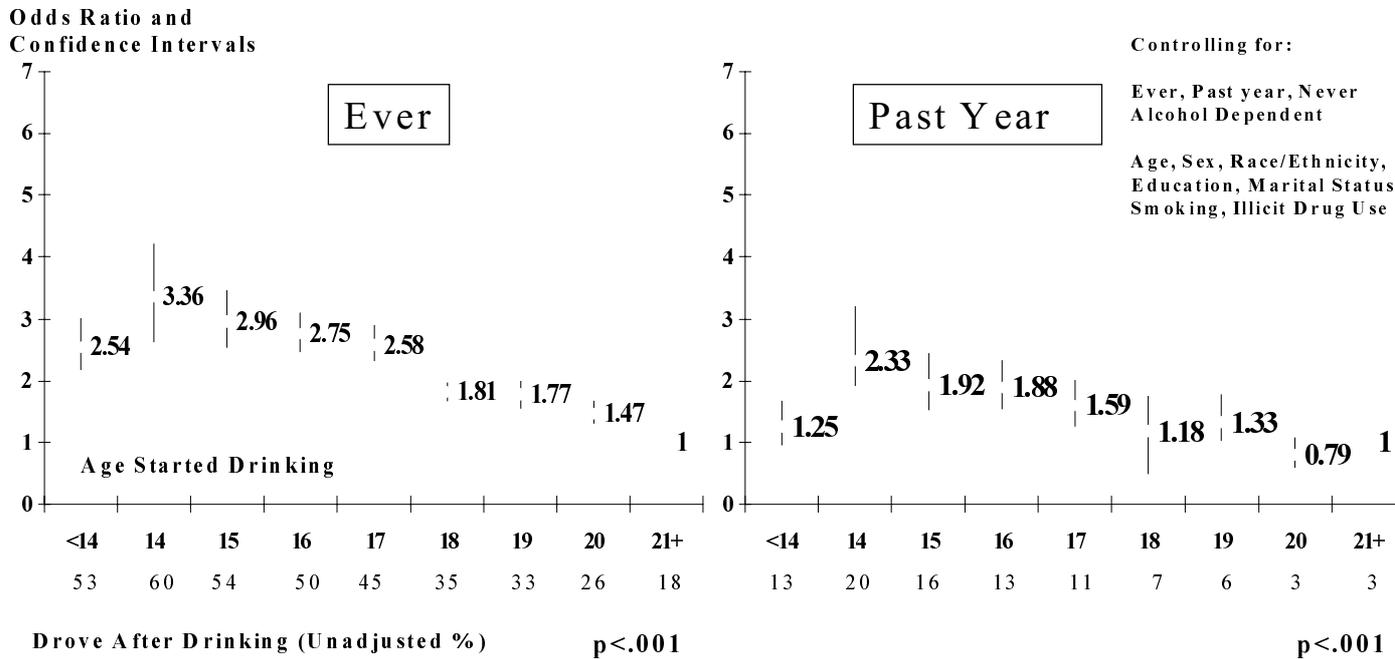
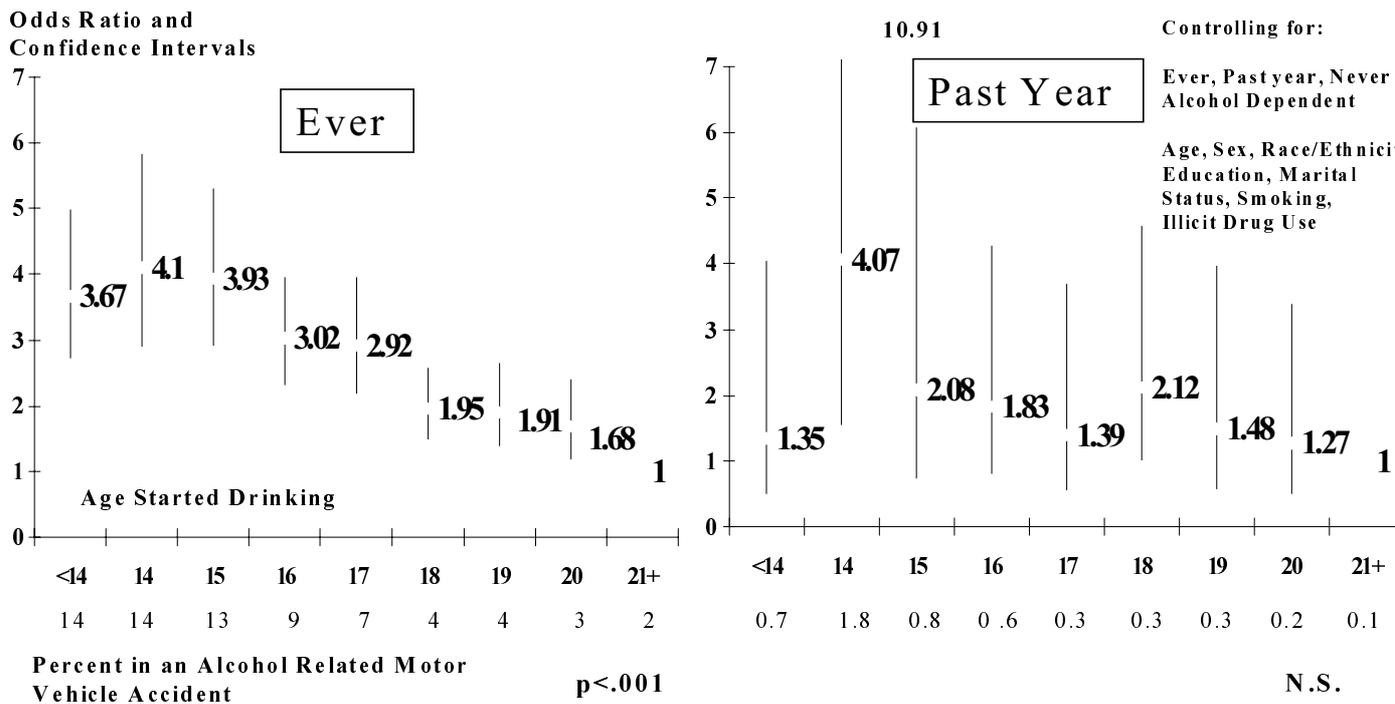


Figure 2: In a Motor Vehicle Accident Because of Drinking Too Much According to Age of Drinking Onset (NLAES)



References

1. *Health United States, 1996 – 1997 and Injury Chartbook*. Washington, DC: U.S. Department of Health and Human Services; 1997. DHHS Publication No PHS 97-1232.
2. *Traffic Safety Facts, 1997*. Washington, DC: U.S. Department of Transportation, National Highway Traffic Safety Administration; 1998. DOT HS 808 806.
3. *Drinking age laws: an evaluation synthesis of their impact on highway safety*. Washington, DC: General Accounting Office; 1987. GAO PEMD 87-100.
4. *Traffic Safety Facts: Alcohol 1997*. Washington, DC: National Highway Traffic Safety Administration, National Center for Statistics and Analysis; 1998.
5. O' Malley P, Wagenaar A. Effects of minimum drinking age laws on alcohol use, related behaviors, and traffic crash involvement among American youth. *J. of Alcohol Studies*. 1991; 52:478 – 491.
6. Grant, B. The impact of family history of alcoholism on the relationship between age at onset of alcohol use and DSM-III alcohol dependence. *Alcohol Health and Research World*. 1998; 22(2):144 – 147.
7. Massey JT, Parsons VL, Tadros W. Design and estimation for the national health interview survey, 1985 – 1994. In: *Vital and Health Statistics Report Series 2(10)*, Hyattsville, MD: National Center for Health Statistics, U.S. Department of Health and Human Services; 1989.
8. Shah BV, Barnwell BG, Bieler GS. *SUDAAN User's Manual, Release 7.0*. Research Triangle Park, NC: Research Triangle Institute; 1996.
9. *National Survey of Drinking and Driving Attitudes and Behavior*. Washington, DC: U.S. Department of Transportation, National Highway Traffic Safety Administration; 1996. DOT HS 808 438.
10. O'Malley PM, Johnston LD. Drinking and driving among high school seniors. *American Journal of Public Health*. 1999; 89(5):678-684.