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An Analysis of State Underage Drinking Policies and Adolescent Alcohol Use

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OVERVIEW

Alcohol use among adolescents has been declining for years, yet evidence of the effectiveness of alcohol control policies intended to limit underage drinking is mixed. This brief examines the relationship between 14 state underage drinking laws and drinking prevalence among U.S. high school students, using data from four years (between 2005 to 2011) from the Youth Risk Behavior Surveillance Survey (YRBSS), the Alcohol Policy Information System (APIS), and Child Trends' own state policy database.

KEY FINDINGS

- Between 2005 and 2011, adolescent drinking declined; at the same time, states passed more laws aimed at limiting underage drinking.
- Of 14 state underage drinking policies, we find that all but three are unrelated to adolescent drinking outcomes. Higher beer taxes are associated with lower adolescent binge drinking and current alcohol use rates. Also, laws that require beer kegs to be registered are associated with lower rates of current alcohol use. By contrast, state laws that impose a driver's license penalty for consumption are associated with higher rates of current alcohol use. These associations may reflect a response to already-existing underage drinking in a state, so causality cannot be assumed.
- States with more underage drinking policies in place in 2009 had higher drinking rates in 2011 – although the number of policies and adolescent drinking rates were unrelated in all other years.
- These findings are consistent with the mixed results from past research. This may indicate that factors we cannot measure at a state level, such as family, peer, and other environmental influences, have a stronger impact on adolescent drinking rates than state laws intended to restrict minors' access to alcohol.



BACKGROUND

Alcohol use among adolescents has declined over the last 10 years. Nevertheless, in 2011, more than 38 percent of youth ages 12 to 17 reported having drunk alcohol in the past 30 days (Centers for Disease Control and Prevention 2012), so, adolescent alcohol use remains a serious problem. The potential negative consequences of drinking in adolescence are many – from risky sexual behavior to accidental injury to an elevated risk of alcohol abuse in adulthood (Substance Abuse and Mental Health Services Administration 2012).

States have had authority over alcohol control since prohibition; however, the National Minimum Drinking Age Act (NMDA) of 1984 authorized the reduction of federal highway funds for states that did not increase the minimum legal age for purchase or possession of alcohol to 21. Four years after this act was passed, all states had implemented such laws, although many states still have exceptions under which a minor's possession of alcohol is allowed. Research has found that traffic accidents involving alcohol, self-reported drinking and driving, and self-reported drinking among youth decreased following the implementation of minimum drinking age laws (Klepp, Schmid et al. 1996; Wagenaar and Toomey 2002; Carpenter, Kloska et al. 2007).

Since the NMDA, states have introduced a variety of additional laws to curb underage drinking, typically aimed at reducing access or availability, or setting consequences for alcohol use. All states currently have “zero tolerance” laws for alcohol consumption, which set the blood alcohol content (BAC) cut-off for minor drivers at or below 0.02 (the legal limit for adults, in all states, is 0.08). Evidence to support these laws is mixed. While some studies have found that zero tolerance laws are associated with decreased underage drinking (Kloska et al. 2007), others have found an association only for some subgroups of youth or no association at all (Wagenaar, O'Malley et al. 2001; Carpenter 2004).

All states prohibit adults from furnishing alcohol to minors, although states often have exceptions to these laws, such as allowing a parent to serve his or her minor child in their own home. Many states have introduced additional laws to prevent retailers, parents, and other adults from supplying alcohol to minors. For example, many states have introduced “social host” laws, which hold individuals liable for underage drinking and/or the actions resulting from underage drinking that takes place on property they control. Other laws include a minimum age for people who serve or sell alcohol, and beer keg registration requirements, which enable tracking of retailers that sell kegs to, or adults who purchase kegs for, underage youth. However, these policies are not as well-studied and have less evidence of effectiveness (Holder 2004; Paschall, Grube et al. 2012).

Some policies prescribe particular consequences for underage drinking. Consequences include fines, community service, mandatory treatment for alcohol dependence, and, increasingly, driver's license suspension or revocation (often referred to as “use-and-lose” laws).

Excise taxes, or taxes per unit of alcohol, are, in theory, passed along to the consumer in the form of higher prices, and are often studied in relation to underage drinking as a proxy for the price of alcohol. Increasing taxes can be an important policy lever and although it is an approach that does not target underage drinking specifically, most research indicates higher taxes have been associated with lower drinking rates among youth (Chaloupka,



Grossman et al. 2002; Chaloupka 2004; Elder 2010). However, most states have increased their excise taxes only moderately over time, so that in many states, the inflation-adjusted tax rate has actually declined (Chaloupka 2004).

Overall, evidence to support the effectiveness of laws hypothesized to reduce underage drinking is mixed. Some studies indicate that, for college students, underage drinking is more likely to decrease when there are multiple policies in place (Wechsler, Lee et al. 2002; Nelson, Naimi et al. 2005), indicating that it may be the combination of policies or the number of policies that make a difference. There is also preliminary evidence to suggest that some of these policies – including lower BAC limits, laws prohibiting the use of fake identification, stronger purchase and possession laws, and more restrictive use-and-lose laws – are related to fewer alcohol-related car accidents or reductions in driving under the influence of alcohol (Chaloupka, Saffer et al. 1993; Wagenaar, O’Malley et al. 2001; Fell, Fisher et al. 2007; Cavazosâ-Rehg, Krauss et al. 2012).

To expand and update the literature regarding the relationship between state laws and underage drinking, this study used four years of data across which a national decline in underage drinking occurred, to examine whether states with a greater number of alcohol control policies, more-restrictive policies, or higher alcohol taxes had lower drinking rates among high school students.

METHODS

Sample

Forty-one states with data on the prevalence of binge drinking and current alcohol use among high school students for the years 2005, 2007, 2009, and 2011 were included in the analysis. Nine states (Utah, Hawaii, California, Virginia, Minnesota, Nebraska, Oregon, Pennsylvania, and Washington) were excluded due to extensive missing data or being extreme outliers.

Measures

Underage drinking. The YRBSS is an annual survey that monitors health-risk behaviors among youth and young adults. For this analysis, we examined the percent of 9th to 12th grade students in a state who reported they had at least one drink of alcohol on at least one day in the past 30 days (current use) and the percent who reported binge drinking, that is, having had five or more drinks in a row “within a couple hours,” in the past 30 days.

Alcohol control laws. Data on state alcohol policies are from the National Institute on Alcohol Abuse and Alcoholism’s Alcohol Policy Information System (APIS).¹



The specific laws examined in this analysis are:

- prohibition of alcohol consumption among minors;
- exceptions to minor possession laws;
- exceptions to minor furnishing laws;
- social host laws;
- blood alcohol content limits for minors;
- use/lose laws that define driver's license penalties for minors –
 - whether or not they are mandatory,
 - the age limit above which they cannot be imposed, and
 - the infractions for which they are imposed: possession, consumption, and/or purchase of alcohol, possession of a fake identification;
- whether retail locations have identification scanners;
- beer keg registration requirements;
- age-of-server limits;
- beer excise taxes in 2005; and,
- spirits excise taxes in 2005.

Analysis Method

This analysis was run in three parts. To assess the relationship between individual policies and drinking rates, each dichotomous policy variable was analyzed using a hierarchical linear model (HLM). State alcohol taxes were analyzed using multiple linear regressions. Finally, to assess the importance of the total number out of the 14 policies that a state has in place, we ran a panel model using hierarchical regression. Analyses were run separately to predict current alcohol use and binge drinking rates. See the Appendix for more information about the data and methods used in this brief.

All of these models included statistical controls for the following key demographic characteristics of states in 2005: the state unemployment rate; the percent of the state population who are white; the percent of the state population who have at least a bachelor's degree; and the percent of the state population who live in poverty. These data were obtained from the Child Trends State Policy Database, a compendium of data collected from various federal and state sources, such as the Census Bureau and the Bureau of Labor Statistics.

¹ National Institute on Alcohol Abuse and Alcoholism. Alcohol Policy Information System (APIS) Web site. Retrieved January 2013, from www.alcoholpolicy.niaaa.nih.gov.

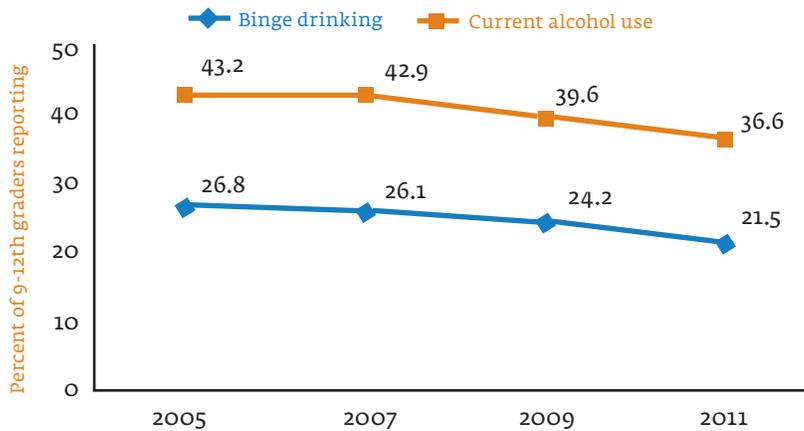


UNDERAGE DRINKING AND LAWS OVER TIME

Drinking Rates

Figure 1 shows the average rates of current alcohol use and binge drinking across states, both of which declined significantly from 2005 to 2011. However, drinking rates in individual states did not decline at the same rate or consistently across the years we included in the analysis. Further, while the average drinking rates declined each year overall, not all states saw a year-to-year decrease.

FIGURE 1: CURRENT ALCOHOL USE AND BINGE DRINKING RATES - MEAN ACROSS STATES BY YEAR



Policy

In 2005, states had an average of 49 percent of the 14 alcohol policies in place, and by 2011 the average was just over 52 percent. A handful of states changed their policies during this time period. For example, six states implemented social host laws, five states made minors’ consumption of alcohol illegal, and three states implemented a driver’s license penalty for consumption.



FINDINGS

When analyzed individually, only three policies were significantly related to underage drinking rates: laws requiring keg registration, driver's license penalties for consumption, and beer taxes. States that required beer kegs to be registered had lower rates of current alcohol use on average across all four years ($\beta = -1.54, p = 0.02$). States with a law imposing a driver's license penalty for consumption had higher current alcohol use rates ($\beta = 1.87, p = 0.03$). Beer taxes were significantly and negatively related to both binge drinking ($\beta = -4.96, p < 0.01$) and current alcohol use ($\beta = -3.69, p = 0.03$) across all four years, meaning that states with higher taxes had lower drinking rates. No other taxes or laws were associated with differences in drinking rates between states over time.²

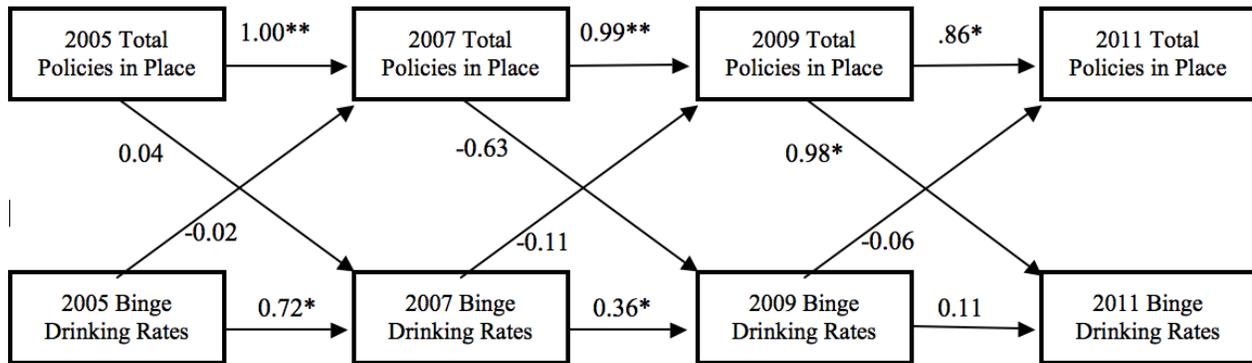
Figure 2 presents the panel model results for current alcohol use. After controlling for all previous levels of current alcohol use and the total number of policies held at previous time points, we found that states with more policies in 2009 had higher current-use drinking rates in 2011 ($\beta = 1.43, p < .05$). The same trend was found for binge drinking levels (Figure 3), such that the total number of policies held by a state in 2009 was significantly and positively related to binge drinking levels in 2011 ($\beta = 0.98, p < .05$).

However, drinking rates in 2009, both current use and binge drinking, are not significantly associated with the total number of policies in 2011 ($\beta = -0.00, ns; \beta = -0.06, ns$). These findings do not align with the expectation that states with higher drinking rates in 2009 would subsequently have put more alcohol policies in place. No other trends were found to be significant; thus the number of underage drinking laws in a state was not related to drinking rates in the same year or subsequent years, except for between 2009 and 2011. These findings for a single two-year period are not definitive. As noted, these analyses cannot establish causality; and we emphasize that most policy variables were not associated with binge drinking or current alcohol use levels. States with higher drinking rates in one year have higher drinking rates in subsequent years, and states with more policies in one year tend to have more policies in subsequent years. Together, these findings suggest that factors that we cannot measure at a state level, such as family, peer, and other environmental influences, may have a stronger impact on adolescent drinking rates than laws intended to restrict minor's access to alcohol.

² In other analyses using repeated measures ANCOVAs, laws imposing a driver's license penalty for consumption were significantly related to current alcohol use in all four years, but keg registration laws were not. In those models, states were grouped by the number of years they had a law in place, while in the HLM models, each state was marked as having the law or not in each year individually.

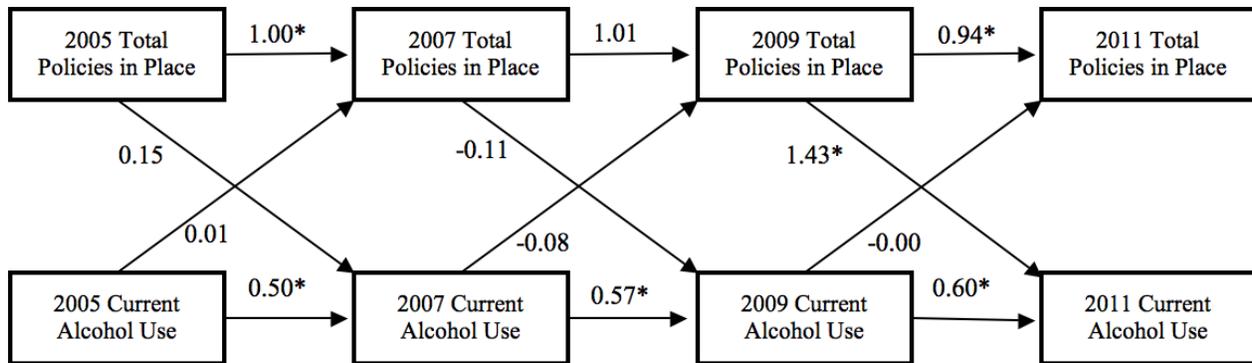


FIGURE 2: CURRENT ALCOHOL USE, PANEL MODEL RESULTS



2005 unemployment rate, percent in poverty, percent white, and percent with a BA also included in model – results not shown.
 * p < 0.05 ** p < 0.001

Figure 3: Binge drinking, panel model results



2005 unemployment rate, percent in poverty, percent white, and percent with a BA also included in model – results not shown.
 * p < 0.05 ** p < 0.001

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REFERENCES

- Carpenter, C. (2004). "How do Zero Tolerance Drunk Driving Laws Work?" *Journal of Health Economics* 23(1): 61-83.
- Carpenter, C. S., D. D. Kloska, et al. (2007). "Alcohol Control Policies and Youth Alcohol Consumption: Evidence from 28 Years of Monitoring the Future." *The B.E. Journal of Economic Analysis & Policy* 7(1).
- Cavazosâ-Rehg, P. A., M. J. Krauss, et al. (2012). Associations between selected state laws and teenagers' drinking and driving behaviors, Wiley Online Library. 36: 1647-1652.
- Centers for Disease Control and Prevention (2012). "Youth Risk Behavior Surveillance - United States 2011." *MMWR* 61(4): 162.
- Chaloupka, F. J. (2004). The Effects of Price on Alcohol Use, Abuse, and Their Consequences. *Reducing Underage Drinking: A Collective Responsibility*. R. J. O. C. Bonnie, Mary Ellen. Washington, D.C., National Academies Press: 541-564.
- Chaloupka, F. J., M. Grossman, et al. (2002). "The effects of price on alcohol consumption and alcohol-related problems." *Alcohol Res Health* 26(1): 22-34.
- Chaloupka, F. J., H. Saffer, et al. (1993). Alcohol control policies and motor vehicle fatalities, National Bureau of Economic Research.
- Elder, R. W., Lawrence, Briana, Ferguson, Aneeqah, Naimi, Timoly S., Brewer, Robert D., Chattopadhyay, Sajal K., Tommey, Traci L., Fielding, J.E., the Task Force on Community Preventive Services (2010). "The Effectiveness of Tax Policy Interventions for Reducing Excessive Alcohol Consumption and Related Harms." *American Journal of Preventive Medicine* 38(2): 217-229.
- Fell, J. C., D. A. Fisher, et al. (2007). The relationship of 16 underage drinking laws to reductions in underage drinking drivers in fatal crashes in the United States. *Annual Proceedings/Association for the Advancement of Automotive Medicine*, Association for the Advancement of Automotive Medicine. 51: 537.
- Holder, H. D. (2004). Supply Side Approaches to Reducing Underage Drinking: An Assessment of the Scientific Evidence. *Reducing Underage Drinking: A Collective Responsibility*. R. J. Bonnie, O'Connell, Mary Ellen. Washington, D.C., National Academies Press: 458-489.
- Klepp, K.-I., L. A. Schmid, et al. (1996). "Effects of the Increased Minimum Drinking Age Law on Drinking and Driving Behavior Among Adolescents." *Addiction Research & Theory* 4(3): 237-244.
- Nelson, T. F., T. S. Naimi, et al. (2005). "The State Sets the Rate: The Relationship Among State-Specific College Binge Drinking, State Binge Drinking Rates, and Selected State Alcohol Control Policies." *American Journal of Public Health* 95(3): 441-446.
- Paschall, M. J., J. W. Grube, et al. (2012). Relationships between local enforcement, alcohol availability, drinking norms, and adolescent alcohol use in 50 California cities, Alcohol Research Documentation, Inc. 73: 657.
- Substance Abuse and Mental Health Services Administration (2012). Results from the 2011 National Survey on Drug Use and Health: Summary of National Findings, Rockville, MD: Substance Abuse and Mental Health Services Administration.
- Wagenaar, A. C., P. M. O'Malley, et al. (2001). Lowered legal blood alcohol limits for young drivers: effects on drinking, driving, and driving-after-drinking behaviors in 30 states, American Public Health Association. 91: 801.
- Wagenaar, A. C. and T. L. Toomey (2002). "Effects of minimum drinking age laws: review and analyses of the literature from 1960 to 2000." *Journal of Studies on Alcohol* 14: 206-225.
- Wechsler, H., J. E. Lee, et al. (2002). Underage college students' drinking behavior, access to alcohol, and the influence of deterrence policies: Findings from the Harvard School of Public Health College Alcohol Study, Taylor & Francis. 50: 223-236.



APPENDIX A: DATA SOURCE AND METHODOLOGY

Measures of underage drinking - The Youth Risk Behavior Surveillance Survey¹ includes national, state, territorial, tribal, and local level data of representative 9th to 12th grade students. The state-level surveys are conducted by departments of health and education and are representative mostly of public high school students. State-level data were obtained for current use drinking from the dichotomous item, “Had at least one drink of alcohol on at least one day.” State-level data were obtained for binge drinking from the dichotomous item, “Had five or more drinks of alcohol in a row within a couple hours on at least one day.” Forty-one states were included in the analysis, with eight states (Utah, Hawaii, California, Virginia, Minnesota, Nebraska, Oregon, Pennsylvania, and Washington) excluded due to extensive missing data or removed as extreme outliers.

Measures of alcohol policy - All data on state alcohol policies come from the National Institute on Alcohol Abuse and Alcoholism’s Alcohol Policy Information System.² Individual laws, except for taxes, were each coded as binary variables such that states with the more restrictive policy were coded as “1.” For example, states that allow exceptions to their laws that restrict possession of alcohol by minors, such as allowing possession in the presence of a family member, were coded as less restrictive (zero) while states that do not allow exceptions were coded as more restrictive (one). Beer and spirits taxes are the specific excise taxes (the tax per gallon at the wholesale or retail level). As only four states increased either their spirits or beer excise taxes between 2005 and 2011, we measured taxes only in the year 2005. We examined the 16 laws individually, as well as a single continuous measure of how many of 14 laws (excluding taxes) a state had in place as of January 1 of each year.

Measures of state demographic and economic characteristics - Data on the state unemployment rate, the percent of the state population who are white, the percent of the state population who have at least a Bachelor’s degree, and the percent of the state population who live in poverty were obtained from the Child Trends State Policy Database for only the year 2005.

Analytic method - Prior to analysis, all variables were screened through various programs using SPSS for accuracy of data entry, missing data, and fit between their distributions and the assumption of the analysis. The univariate outliers – Utah and Hawaii – found in both current use and binge drinking rates were dropped in order to reduce the skewness and kurtosis of the data.

Each dichotomous policy variable was analyzed using a hierarchical linear model (HLM) with laws nested within state. Beer and spirit taxes were analyzed using multiple linear regressions. Data on the total number of policies were analyzed with a panel model using hierarchical regression to assess longitudinal associations between both current use drinking and binge drinking at four different time points (2005, 2007, 2009, 2011). First, the total number of policies in place in the previous year was regressed upon the current use or binge drinking rates of the following year. This was done for all time points. Second, drinking rates were regressed onto the total number of policies in the following year, to exclude them as drivers in the model. Step one of each model included control variables. The key independent variable was entered in step two, to evaluate if change takes place in the overall model when it was added. Drinking rates and the total number of policies were also each regressed on each year to identify significant changes over time in those variables.

1 Centers for Disease Control and Prevention (CDC). 1991-2011 High School Youth Risk Behavior Survey Data. Available at <http://apps.nccd.cdc.gov/youthonline>. Accessed January, 2013.

2 National Institute on Alcohol Abuse and Alcoholism. Alcohol Policy Information System (APIS) Web site. Retrieved January 2013, from www.alcoholpolicy.niaaa.nih.gov.