

## **Heavy Alcohol Use and the Commission of Nuisance Crime: Evidence from Underage Drunk Driving Laws**

By Christopher S. Carpenter \*

“[L]iquor doesn’t make people idiots. The idiots already exist.”

- Brendan Ryan, age 26, as quoted by the Boston Globe when asked about Mayor Thomas Menino’s threat to ban liquor sales during the 2004 World Series to prevent the kinds of violence and looting that ensued after the Red Sox beat the Yankees in Game Seven of the 2004 ALCS.

There is extensive evidence documenting a strong relationship between alcohol use and crime. The Bureau of Justice Statistics (BJS) reports that over a third of convicted offenders in 1996 were drinking at the time of their offense (1998). The evidence is less clear, however, that heavy alcohol use *causes* individuals to commit crime, for example by increasing aggression, lowering inhibition, or altering perceptions of acceptable behavior. Alternatively, it could be that some unobserved third factor such as risk preference causes individuals both to consume alcohol and to commit crime. In this case, one might observe a positive relationship between alcohol use and crime even in the absence of a true causal effect. Indeed, this is the sentiment echoed in the introductory quote: even in the presence of a strong alcohol/crime relationship, it is not clear that reducing alcohol consumption would subsequently reduce crime.

A key difficulty in identifying a compelling research design that would credibly estimate the causal effect of alcohol use on crime is finding a mechanism that generates arguably exogenous variation in alcohol consumption. In this paper, I use adoption of tougher drunk driving laws aimed at youth under age 21 to estimate the effect of heavy episodic alcohol use on the commission of crime. These “Zero Tolerance” (ZT) laws were enacted by every state over the past two decades and substantially lowered the legal

blood alcohol content (BAC) limit for underage drivers. Previous research has shown that these tougher laws reduced heavy episodic drinking by young men age 18-20 but had no effect on slightly older males age 22-24 (Carpenter 2004a). In the context of identifying effects of alcohol use on crime, ZT laws are particularly attractive because 1) adoption of tougher drunk driving policies is arguably uncorrelated with omitted determinants of criminal behavior; 2) there is substantial variation across states in the timing of policy adoption; and 3) the laws create sharp predictions about which age groups should have been affected.

I focus on nuisance crimes such as vandalism, public drunkenness, and disorderly conduct; evidence suggests that these socially costly crimes may be particularly sensitive to heavy alcohol use. Wechsler et al. (2002), for example, found that neighborhoods surrounding college campuses with high rates of binge drinking were more likely to experience negative “secondhand effects” such as noise and disturbances, vandalism, drunkenness, vomiting, and urination than other neighborhoods. Indeed, some of the most compelling previous research in this area found strong effects of alcohol use on nuisance crime. Jochsch and Jones (1993) used well-documented variation in alcohol availability induced by increases in states’ Minimum Legal Drinking Age (MLDA) in the 1980s and found that higher MLDA were associated with a lower incidence of vandalism and disorderly conduct (on the order of 10 percent) among the treated age groups relative to those unaffected by the more restrictive alcohol policy. A more recent study used data on individuals age 12 and older from the 1991 cross section of the National Household Survey on Drug Abuse and found that beer taxes were negatively related to self-reported property damage (Saffer 2001). In fact, most studies in the

alcohol and crime literature have also used variation in the level of the state beer tax, but few have focused on nuisance crimes.

## **I. RESEARCH DESIGN AND DATA DESCRIPTION**

In this paper I make use of a set of drunk driving laws aimed at underage individuals that have been adopted at different times by all 50 states. These “Zero Tolerance” (ZT) laws were motivated by the fact that the nationwide MLDA is 21. As such, it may be reasonable to expect that any driver under age 21 should not have measurable amounts of alcohol in his blood. Indeed, these laws *require* states to suspend the license of any underage driver who has a blood alcohol content (BAC) above .02 or .00, depending on the state. Maine was the first state to enact this type of law in 1983, and all states adopted ZT laws by July of 1998. The 1995 National Highway Systems Designation Act threatened states with the loss of federal highway funding if they did not adopt a ZT law. Several published studies have shown these laws to have been effective at reducing underage highway fatalities likely to have involved alcohol (see, for example, Voas et al. 2003 and recent reviews by Shults et al. 2001 and Zwerling and Jones 1999). Carpenter (2004a) shows that one way these laws “worked” was to moderate heavy alcohol use among underage males age 18-20 by about 13 percent, with no effect for slightly older males age 22-24 who were unaffected by the underage policies.

This research design exploits two key observations: (1) ZT laws are robust policy levers with respect to heavy episodic drinking among young males; and (2) adoption of these tougher drunk driving laws is arguably unrelated to omitted determinants of age-specific crime. While offenses such as driving under the influence (DUI) and vehicular

homicide are clearly policy targets of drunk driving laws, the same is not true of socially costly crimes such as disorderly conduct and vandalism. Indeed, qualitative evidence overwhelmingly indicates that traffic fatality reductions and highway safety were the key reasons states passed ZT laws. As such, these drunk driving laws may be plausibly exogenous with respect to crimes other than DUI.

To estimate the effect of ZT laws on crime, I use data on arrests of adult males by single year of age for police agencies in Metropolitan Statistical Areas (MSAs) from the FBI Uniform Crime Reports.<sup>i</sup> These administrative data cover agencies in MSAs and span the time period (1988-1997) over which most ZT laws were adopted by states. The data were compiled and cleaned by two criminologists and include counts of arrests for 43 major types of crime (Chilton and Weber, 2000). For the purpose of this study, I consider arrests for driving under the influence, public drunkenness, disorderly conduct, and vandalism. As is standard in the criminology literature, I use all observations where the police agency reported arrest data for at least a six month period, and I inflate arrest counts by relevant factors for those agencies who reported less than twelve months of data.

To capture the age-specific nature of ZT laws, I create a dependent variable that similarly reflects the age structure of crime within a police agency. Specifically, I construct an age-specific arrest ratio,  $R_{pt}$ , by dividing the number of arrests of 18-20 (22-24) year old males by the total number of arrests of adult males in a police agency. This class of dependent variable has been used previously by both economists and criminologists (see, for example, Joksch and Jones 1993 and Conlin, Dickert-Conlin, and

Pepper 2002). I estimate the reduced form effect of ZT laws using OLS in the following model:

$$(1) R_{pt} = \beta_0 + \beta_1 Z_{st} + \beta_2 (\text{Zero Tolerance})_{st} + \beta_3 P + \beta_4 T + \varepsilon_{st}$$

where  $R_{pt}$  is the age-specific arrest ratio for agency  $p$  in year  $t$ , as described above. I estimate separate regressions for males in each age group.  $Z$  is a vector of state variables that may be correlated with the key variables of interest or that have been shown in previous work to be empirically important determinants of crime. These include: the real value of the federal and state excise tax on beer (in 2001 dollars), fraction of population age 15-19, fraction black, share of population below the federal poverty level, per capita income (in 2001 dollars), a variable indicating the Minimum Legal Drinking Age is 21, and the presence of each of three drunk driving policies aimed at adults.<sup>ii</sup> Zero Tolerance is a variable that equals the fraction of the year for which the state ZT policy is in place, and the coefficient of interest,  $\beta_2$ , captures the effects of the ZT policies on crime. Dummy variables for each police agency control for time-invariant agency-specific factors and are captured by  $P$ . Dummy variables for each survey year control for period-specific shocks common to all police agencies in any given year and are captured by  $T$ . All regressions are weighted by the covered population as reported by the police agency, and standard errors are clustered at the state level (Bertrand, Duflo, and Mullainathan 2004).

The intuition in this paper is straightforward: a causal role for alcohol use in the commission of nuisance crime should be characterized by a reduction in arrests when ZT laws are adopted. Moreover, these reductions should be age-specific, since the changes in alcohol use associated with ZT laws were themselves age-specific. Therefore, if

alcohol use causes the commission of crime, then one should observe reductions in the 18-20 year old arrest ratio, but not the 22-24 year old arrest ratio. Put differently, the 22-24 year old males provide an important counterfactual for what would have happened to the criminal activity of 18-20 year olds in the absence of ZT policies (and, by implication, heavy alcohol use). As such, arrests of 22-24 year olds account for contemporaneous changes in criminality that may be spuriously associated with ZT laws but that are not due to the reductions in alcohol use.<sup>iii</sup>

## **II. FINDINGS**

I begin by presenting evidence of the effect of ZT laws on the age composition of DUI arrests. Mechanically, ZT laws should increase arrests of 18-20 year olds for driving under the influence unless the behavioral response of youths was complete (Carpenter 2004a suggests it was not). Table 1 indicates an important finding that ZT laws had a positive, significant, and direct effect on arrests of 18-20 year olds for driving under the influence (DUI), even after controlling for all the variables described above, including police agency and year fixed effects. This suggests that another way ZT laws reduced fatalities was by removing dangerous underage drivers from the nation's highways. Relative to its pre-reform mean, the top panel of Table 1 suggests that ZT laws reduced the 18-20 DUI arrest ratio over the decade 1988-1997 by about 5 percent. I find no significant effect of ZT laws on the 22-24 year old arrest ratio for DUI.

While crimes such as DUI are explicitly linked to alcohol use, there are other sets of crimes that are commonly thought to be associated with alcohol use in less direct ways. Often termed "nuisance" crimes, these offenses are generally characterized by

large social costs relative to direct economic costs. I use anecdotal evidence that when arresting individuals for the negative effects of heavy alcohol consumption, police officers typically choose either “public drunkenness” or “disorderly conduct”. Considering arrests for these two crime categories, I find in the top panel of Table 2 that ZT laws reduced the 18-20 year old arrest ratio for these two crimes on the order of 5 percent relative to its pre-reform mean. Notably, the 22-24 year old arrest ratio for these crimes was unaffected by ZT laws. This is consistent with the idea that ZT laws moderated heavy alcohol use by 18-20 year old males but not 22-24 year old males.

The bottom panel of Table 2 considers the reduced form effect of ZT laws on the nuisance crime of vandalism. I consider vandalism separately because previous research suggests that increases in the MLDA induced large reductions in vandalism arrests (Joksch and Jones 1993). The results in Table 2 are consistent with the effects found by previous studies and suggest that ZT laws reduced the 18-20 year old arrest ratio for vandalism by about 4.5 percent relative to the pre-reform mean. Again, there are no ZT effects for 22-24 year olds.

Finally, Table 3 provides an important replication of the key comparison results in Joksch and Jones (1993) using state changes in Minimum Legal Drinking Ages. I estimate a variant of equation (1) on data from the period 1980-1987 when most of the MLDA increases took place. These results confirm that reductions in alcohol availability associated with higher MLDA were associated with reduced vandalism and disorderly conduct arrests of 18-20 year olds. While their empirical approach and data differ slightly from those considered here, I am able to reproduce their main result that nationwide increases in the MLDA (to age 21) were associated with significant

reductions in both vandalism and disorderly conduct. Specifically, the estimates in Table 3 indicate that, relative to the pre-reform mean of the 18-20 year old arrest ratio, an MLDA of 21 reduced vandalism arrests by 3.2 percent and disorderly conduct arrests by 3.4 percent, both significant at the 10 percent level.

### **III. DISCUSSION**

The estimates in Tables 1 through 3 suggest an important role for drunk driving policy in the reduction of nuisance crime committed by youths. Specifically, I estimate that adoption of ZT laws reduced the fraction of nuisance crime arrests attributable to 18-20 year olds on the order of 5 percent. Recall that in the pre-ZT regime, 18-20 year old males represented over 30 percent of all adult male arrests for nuisance crimes (for police agencies in MSAs); this implies that ZT laws reduced overall male nuisance crime in MSAs by about 1-2 percent.

This paper has provided new evidence on the relationship between heavy alcohol use and the commission of nuisance crime by youths. I use variation induced by adoption of laws that make it illegal for underage drivers to have any noticeable amount of alcohol in their blood. Previous research shows that these laws significantly reduced heavy episodic alcohol use among young men age 18-20, with no effect for slightly older males age 22-24 (Carpenter 2004a). I use age-specific arrest data for MSAs at the police-agency level to estimate two-way fixed effects models of ZT laws and crime.

I find that ZT laws altered the age structure of arrests for driving under the influence. DUI arrests of 18-20 year old males increased relative to those for older males on the order of 4 percent. Results also indicate that ZT laws reduced arrests of young

men in the targeted age group for alcohol-related offenses such as public drunkenness and disorderly conduct, as well as the nuisance crime of vandalism. Overall, these results provide novel and new evidence consistent with a causal role for heavy alcohol use in the commission of nuisance crime by youths.

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**Table 1**  
**ZT Laws Increased 18-20 year old DUI Arrest Ratio**  
**OLS Estimation, Dependent Variable is Age-Specific Arrest Ratio**  
**Adult males, 1988-1997**

	(1) 18-20 year olds	(2) 22-24 year olds
<b>DUI</b>		
Pre-Reform Mean of Arrest Ratio	.079	.124
Zero Tolerance	0.004* (0.002)	-0.003 (0.002)
N	51432	51432
R-squared	0.46	0.40
Controls For:		
Police Agency and Year Fixed Effects?	X	X
Other alcohol control policies?	X	X
Demographic, price, and macroeconomic controls?	X	X

\* significant at 5%; \*\* significant at 1%. Standard errors throughout are clustered at the state level.

**Table 2**  
**ZT Laws Reduced 18-20 year old Nuisance Crime Arrest Ratios**  
**OLS Estimation, Dependent Variable is Age-Specific Arrest Ratio**  
**Adult males, 1988-1997**

	(1) 18-20 year olds	(2) 22-24 year olds
<b>Public Drunkenness &amp; Disorderly Conduct</b>		
Pre-Reform Mean of Arrest Ratio	.183	.141
Zero Tolerance	-0.009* (0.004)	-0.002 (0.003)
N	48505	48505
R-squared	0.46	0.30
<b>Vandalism</b>		
Pre-Reform Mean of Arrest Ratio	.317	.149
Zero Tolerance	-0.014* (0.006)	0.001 (0.003)
N	39462	39462
R-squared	0.35	0.20
Controls For:		
Police Agency and Year Fixed Effects?	X	X
Other alcohol control policies?	X	X
Demographic, price, and macroeconomic controls?	X	X

\* significant at 5%; \*\* significant at 1%. Standard errors throughout are clustered at the state level.

**Table 3**  
**Reproducing the Key Results in Joksch and Jones (1993)**  
**Each Line is a Separate Estimation**  
**OLS Estimation, Dependent Variable is Age-Specific Arrest Ratio (18-20)**  
**Adult males, 1980-1987**

	(1) Vandalism	(2) Disorderly Conduct
Pre-Reform Mean	.372	.265
Drinking Age = 21	-0.012 <sup>‡</sup> (0.006)	-0.009 <sup>‡</sup> (0.005)
N	31220	38538
R-squared	0.41	0.41
Controls For:		
Police Agency and Year Fixed Effects?	X	X
Other alcohol control policies?	X	X
Demographic, price, and macroeconomic controls?	X	X

<sup>‡</sup> significant at 10%; \* significant at 5%; \*\* significant at 1%. Standard errors are clustered throughout at the state level.

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<sup>i</sup> Although there are well-known problems associated with using arrests to measure crime, I do so because crimes are not reported by single year of age. I consider young males both to be consistent with the existing literature and because the “first stage” evidence for ZT laws is stronger for males (Carpenter 2004a). Males are also much more likely to be in the criminal justice system than are females. For example, the median number of arrests for 18-20 year old males in the police agency data is six times that for 18-20 year old females, and fully 42.6 percent of the police-agency level observations for property crime contain zero arrests of 18-20 year old females (the relevant figure for males is only 15.5 percent). I restrict attention to adults because the juvenile justice system carries very different procedures, incentives, and sanctions than the adult corrections system (Levitt 1998) and because data on juvenile crime and custody rates is much less complete than the associated data for adults.

<sup>ii</sup> Information on drunk driving and drinking age policies comes from various years of the Digest of State Alcohol Related Legislation, as well as from personal correspondence with the National Highway Transportation and Safety Administration (NHTSA). The number of states that adopted ZT laws is in Appendix Table 1. Data on beer taxes come from various years of the Brewer’s Almanac. State unemployment rates come from BLS published statistics. I use the Statistical Abstract of the United States, various years, to obtain per capita income (transformed to 2001 dollars), percent of the state population below the federal poverty level, the share of the population that is black, and the share of the population age 15-19. Means for key variables used in the analysis are reported in Table 2. The adult drunk driving policies are discussed at length elsewhere and include lower legal limits for adults (at .08 blood alcohol content and .10 blood alcohol content) and administrative license revocation laws. Carpenter (2004a) showed these laws not to be important predictors of youth alcohol consumption. They are also not systematically related to youth arrests. I include them here for completeness only.

<sup>iii</sup> For examples of similar applications of this research design in the context of age-specific sexually transmitted disease outcomes and suicide outcomes, see Carpenter (2004b, 2004c).