Published in final edited form as:

Traffic Inj Prev. 2015 October 8; 16(0 2): S59–S65. doi:10.1080/15389588.2015.1064909.

Effects of Dram Shop, Responsible Beverage Service Training, and State Alcohol Control Laws on Underage Drinking Driver Fatal Crash Ratios

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Abstract

Objectives—In this study, we aimed to determine whether three minimum legal drinking age 21 (MLDA-21) laws—dram shop liability, responsible beverage service (RBS) training, and state control of alcohol sales—have had an impact on underage drinking-and-driving fatal crashes using annual state-level data, and compared states with strong laws to those with weak laws to examine their effect on beer consumption and fatal crash ratios.

Methods—Using the Fatality Analysis Reporting System, we calculated the ratio of drinking to nondrinking drivers under age 21 involved in fatal crashes as our key outcome measure. We used structural equation modeling to evaluate the three MLDA-21 laws. We controlled for covariates known to impact fatal crashes including: 17 additional MLDA-21 laws; administrative license revocation; blood alcohol concentration limits of .08 and .10 for driving; seat belt laws; sobriety checkpoint frequency; unemployment rates; and vehicle miles traveled. Outcome variables, in addition to the fatal crash ratios of drinking to nondrinking drivers under age 21 included state per capita beer consumption.

Results—Dram shop liability laws were associated with a 2.4% total effect decrease (direct effects: $\beta = .019$, $p = .018$). Similarly, RBS training laws were associated with a 3.6% total effect decrease (direct effects: $\beta = .048$, $p = .001$) in the ratio of drinking to nondrinking drivers under age 21 involved in fatal crashes. There was a significant relationship between dram shop liability law strength and per capita beer consumption, $F(4, 1528) = 24.32$, $p < .001$, partial $\eta^2 = .016$, showing states with strong dram shop liability laws (*Mean (M)* = 1.276) averaging significantly lower per capita beer consumption than states with weak laws (*M* = 1.340).

Conclusions—Dram shop liability laws and RBS laws were both associated with significantly reduced per capita beer consumption and fatal crash ratios. In practical terms, this means that dram shop liability laws are currently associated with saving an estimated 64 lives in the 45 jurisdictions that currently have the law. If the remaining 6 states adopted the dram shop law, an additional 9 lives could potentially be saved annually. Similarly, RBS training laws are associated with saving an estimated 83 lives in the 37 jurisdictions that currently have the law. If the remaining 14 states adopted these RBS training laws, we estimate that an additional 28 lives could potentially be saved.

Keywords

minimum legal drinking age 21; fatal crashes; dram shop laws; responsible beverage service training; state control of alcohol retail sales

INTRODUCTION**Underage Drinking**

Lower minimum legal drinking ages are associated with higher alcohol-related deaths of youth and earlier onset of drinking (Wagenaar and Toomey 2002). Further, research shows that youth who started drinking before age 15, compared with those who waited until age 21, were 12 times more likely to be unintentionally injured, 7 times more likely to be in a motor vehicle crash, and 10 times more likely to be in a physical fight after drinking (Bonnie and O'Connell 2004; Grant and Dawson 1997; Hingson et al. 2002; Hingson et al. 2001; Hingson et al. 2000).

To curb underage drinking and its associated harms, states have adopted multiple laws relating to the minimum legal age of 21 (MLDA-21). Rather than being a single law with identical provisions across the United States, the MLDA-21 has at least 20 provisions targeting outlets that sell alcohol; adults who provide alcohol; and underage persons who purchase, possess, or consume alcohol (see Table 1) (Fell et al. 2015). The National Academy of Sciences Institute of Medicine (Bonnie et al. 2004) and the Substance Abuse and Mental Health Services Administration (SAMHSA 2011) recommend that all states and DC consider adopting these 20 laws aimed at controlling underage 21 drinking. Expanded MLDA-21 laws support the original core laws targeting youth by providing for lower blood alcohol concentration (BAC) limits for drivers under the age of 21 years (zero tolerance), graduated driver licensing (GDL) with nighttime driving restrictions limiting underage drivers' alcohol availability and their drinking and driving, and other legislation. Other MLDA-21 laws target the behaviors of those who may sell or furnish alcohol and include, among others, dram shop liability laws, responsible beverage service (RBS) training laws, and state control of alcohol laws, which are the subject of this study. These provisions of the MLDA-21 law vary notably by state and the effective dates of the laws ranged from before 1982 to 2012. Appendix A details how each of the three laws' strengths and weaknesses were scored.

Dram Shop Laws

A Centers for Disease Control and Prevention task force examined 11 studies that assessed the association of state dram shop liability with various outcomes, and found a median reduction in alcohol-related motor vehicle fatalities of 6.4% associated with the presence of dram shop laws (Rammohan et al. 2011). Dram shop liability is a private cause of action against a retailer for injuries or damages caused by an intoxicated or an underage drinking patron. Our legal research indicates that 44 states and the District of Columbia (DC) have such dram shop laws relating to intoxicated minors (i.e., under the age of 21) (Fell et al. 2015). Very little research has examined the effects of dram shop laws on underage drinking.

Responsible Beverage Service Training Laws

RBS training laws can be mandatory and/or voluntary for all or some alcohol outlets in the state. We obtained the effective dates of these RBS training laws from Westlaw and HeinOnline sources. RBS training and related practices establish requirements or provide incentives for retail alcohol outlets to participate in programs, often referred to as “responsible beverage service” or “server training” programs, to (1) develop and implement policies and procedures for preventing alcohol sales and service to minors and intoxicated persons and (2) train managers and servers/clerks to implement policies and procedures effectively. There is a need to determine which RBS training laws are associated with reductions in underage drinking driver ratios in fatal crashes while states are considering such laws. Additionally, to our knowledge, no research has examined the impact of mandatory versus voluntary RBS involvement and its potential impact on underage drinking and driving outcomes. According to the Alcohol Policy Information System (National Institute on Alcohol Abuse and Alcoholism [NIAAA] 2015), an RBS training program is considered mandatory if state provisions require at least one category of alcohol retail employee (e.g., clerks, managers, owners) to attend training. States with voluntary programs offer up to four incentives to licensees to participate in RBS training: liability defense, mitigation of penalties for sales to minors, discounts on dram shop liability insurance, and protection from license revocation for sales to minors or intoxicated persons.

State Control of Alcohol Sales

There is some evidence of the adverse effects of transitioning from state control to privatization of alcohol sales (Erickson 2012; Stockwell et al. 2009; Task Force on Community Preventive Services 2010; Treno et al. 2013). Therefore, we evaluated the impact (if any) of laws controlling the retail sales of specific alcoholic beverages (e.g., beer, wine, distilled spirits) in states with such laws compared to those without them. This research will inform states considering privatization.

There are two types of retail alcohol distribution systems: license and control. For each alcohol beverage type, a state may use a state-run retail distribution system, a system of private-licensed sellers, or some combination.

Current Study

In this study, we examined three laws: (1) dram shop liability, (2) RBS training, and (3) state control of alcohol laws. We assessed the impact (if any) of these laws by testing a structural model incorporating each of these laws and potential confounding variables, including (1) the other MLDA-21 laws, (2) impaired driving laws, (3) driving safety laws, and (4) economic indicators. Additionally, we included a 26-year-old drinking driver fatal crash ratio to account for general impaired driving trend effects.

Next, we stratified states with dram shop laws into two categories—strong and weak—based on their law strength relative to the national average. Then we examined the differences in RBS laws based on states with mandatory versus voluntary RBS training programs.

METHODS

Research Design

To measure the impact of dram shop liability laws, RBS training, and state control of alcohol sales on underage fatal crash involvement, we used annual state-level data from Fatality Analysis Reporting System (FARS), a census of the fatal crashes that occur in the United States. For each state during the 31 years of analyses (from 1982 to 2012), we determined the number of underage 21 drinking drivers in fatal crashes and compared that to the number of drivers who were not drinking by creating the ratio of drinking to nondrinking under age 21 drivers in fatal crashes. An additional outcome measure of the drinking to nondrinking ratio of drivers aged 26 and older was included to parcel out variance not specific to underaged drivers, while simultaneously controlling for possible underage law carryover effects by excluding drivers aged 21 to 25. We then analyzed the resulting 51-by-31 matrix using a structural equation model (SEM).

Minimum Legal Drinking Age 21 Laws

First, we utilized the APIS (NIAAA 2015) database to update laws on dram shop liability, RBS, and state control of alcohol as well as each of the 17 additional MLDA-21 laws that we controlled for in the analysis: possession, purchase, use and lose, zero tolerance, keg registration, graduated driver licensing with nighttime restrictions, fake ID for minors, fake ID for suppliers, fake ID for retailers, social host civil liability, social host prohibition, age of server, age of bartender, age of seller, consumption, furnishing, and internal possession. Laws were scored for their strengths and weaknesses (see Appendix A for scoring mechanisms) (Fell et al. 2015).

Driver Fatal Crash Involvements

To estimate driver fatal crash involvement by state and year, we examined data from FARS from 1982 to 2012 (NHTSA 2014). FARS is a continuous census of fatal motor vehicle crashes with data documenting all qualifying fatalities that occurred within the 50 states, DC, and Puerto Rico since 1975 and includes person-level and crash-level data. To be recorded in FARS, the crash must have (1) resulted in an individual's death within 30 days of the incident, (2) occurred on U.S. public roadways, and (3) been reported by police. When alcohol-involvement data is incomplete or missing, the BACs of drivers in the FARS database are imputed to obtain a more accurate picture of the involvement of alcohol in the crash (Subramanian 2002).

Per Capita Beer Consumption

Ideally, to measure per capita beer consumption, we would have data on the amount of alcohol consumed by drivers stratified by age groups. However, as these data were not available at the state level, we used annual state-level per capita beer consumption rates for individuals aged 15 years and older. These data were obtained from the annual publication of the National Institute on Alcohol Abuse and Alcoholism's Alcohol Epidemiologic Data System.

Impaired Driving Laws

As in our previous studies, we selected three laws that have demonstrated significant reduction in drinking and driving behaviors including (1) lowering the BAC limit for driving to 0.10 followed later by (2) lowering the BAC limit to 0.08 and (3) administrative license revocation (ALR) laws (Klein 1989; Shults et al. 2001; Voas et al., 2000; Wagenaar et al., 2007; Wagenaar & Maldonado-Molina, 2007). Each of these laws were coded as 0 if the law was absent, and 1 if the law was present; years in which the law was implemented are coded as a fraction to indicate what percentage of the year was covered by the law. For example, if a law was in effect in September, it would be present for a third of that year and coded as 0.33.

When examining latent variables in SEM, one predictor for each latent variable must be fixed to 1 to allow for measurement of the construct. In the current model, the regression weight for ALR laws was set to 1.

Driving Safety Laws

Similarly, we selected two law enforcement efforts that address the safety of drivers on the road and have been shown to significantly reduce traffic fatalities. These efforts included sobriety checkpoint frequency (Fell et al., 2003; Lacey et al., 1999; Peek-Asa 1999) and mandatory seat belt laws (Voas et al., 2007). Data concerning the frequency of sobriety checkpoints were derived from previous research by Fell et al. (2003). Sobriety checkpoints were coded as 0 if checkpoints were illegal or otherwise not conducted, 1 if conducted infrequently, and 2 if conducted frequently (e.g., monthly or weekly). Similarly, coding for seat belt laws was determined by whether states had laws dictating mandatory use. If states did not have this law, they were coded as 0; if they had secondary seat belt laws, they were coded as 1; and if they had primary seat belt laws, they were coded as 2. In the analysis, regression weights for seat belt use laws were set to 1.

Economic Strength

Economic strength was determined by state unemployment rates and vehicle miles traveled (VMT). VMT was derived from Federal Highway Administration data. This data provides an annual estimate of total state VMT. VMT also represents a measure of exposure to a fatal crash. Unemployment statistics were derived from the Bureau of Labor Statistics, which publishes monthly employment statistics by state. VMT was set to 1 in the current model.

Data Analysis

Structural equation modeling—Because this study used both observed (i.e., MLDA-21 laws) and latent constructs (i.e., economic strength) derived from combinations of observed variables as well as simultaneous effects of laws on multiple outcomes (i.e., FARS ratios and beer consumption), SEM was deemed an appropriate analytic technique (Jöreskog 1969; 1967; 1966). SEM is a statistical technique frequently used to estimate causal relationships based on qualitative assumptions represented in a path diagram that allows for the use of intermediate variables, which are both outcomes and predictors such as beer consumption in

the current model. SEM was conducted with Analysis of Moment-Based Structures (AMOS v.21) software, an SPSS-based package (IBM SPSS Inc., Chicago, IL).

Univariate analysis of variance—We examined the difference between states with strong dram shop liability laws and those with weak laws on measures of under age 21 drinking drivers in fatal crashes as a ratio to under age 21 nondrinking drivers in fatal crashes (Voas et al. 2007) and per capita beer consumption. States with dram shop liability law strengths above the national average were categorized as strong law states, while those below the national average were categorized as weak law states. A series of univariate analyses of variance (ANOVA) were conducted to examine the differences between these states.

Next, we compared states with mandatory RBS laws to those with voluntary programs. A series of ANOVAs were conducted to determine how these states differed on measures of under age 21 drinking driver fatal crash ratios and per capita beer consumption. All ANOVAs were conducted using IBM SPSS v21 (IBM SPSS Inc., Chicago, IL).

Hypothesized Model

Figure 1 represents the hypothesized model used in the current research. The model is composed of (1) dram shop liability laws, (2) responsible beverage service training laws, and (3) state control of alcohol laws. It also includes several latent constructs including (4) impaired driving laws as measured by ALR, .08 BAC, and .10 BAC; (5) driving safety laws as measured by seat belt safety and sobriety checkpoint frequency; and (6) economic strength, including unemployment rates and VMT. Outcome variables include (7) beer consumption, (8) under age 21 drinking driver FARS ratios, and (9) over age 25 drinking driver FARS ratios. To control for the simultaneous effect of other laws, MLDA-21 laws were included as control variables.

RESULTS

Table 2 and Figure 1 display the direct effects and significance level of all predictors on outcomes. Estimates are presented regardless of level of significance.

Under Age 21 Drinking Driver Fatal Crash Ratios

The SEM found significant decreases in underage drinking driver fatal crash ratios for dram shop liability laws (−1.9% direct effect, $p = .018$) and RBS laws (−4.9% direct effect, $p = .001$). No significant relationship was found between state control of alcohol and underage drinking driver fatal crash ratios (see Table 2).

In the current model, it is feasible that a law may result in a decrease in beer consumption, which would lead to a decrease in underage drinking driver fatal crash ratios. This is an indirect effect of the laws on the fatal crash ratios with beer consumption as an intermediate variable. Table 3 displays both direct and indirect effects for each of the three alcohol distributor laws. Total effects are particularly vulnerable to changes in the structural model, but they take into consideration both the direct and indirect effects of a predictor on an outcome. Table 3 demonstrates the total effects of dram shop liability laws, RBS training

laws, and state control of alcohol on the underage drinking driver fatal crash ratios. Dram shop liability and RBS training were associated with a 2.4% total effect decrease and a 3.6% total effect decrease in fatal crash ratios, respectively.

Beer Consumption

Interestingly, after controlling for all other variables, RBS training was associated with a significant increase in per capita beer consumption (6.9% direct effect, $p = .001$), while dram shop liability was associated with a trend toward decreasing beer consumption (-2.1% direct effect, $p = .063$), but not quite significant.

In Table 3, we see the indirect effects of all three laws on underage drinking driver fatal crash ratios through the intermediate variable of beer consumption. These estimates indicate that even though dram shop liability laws did not have a significant impact on beer consumption, the laws did have a small impact on underage drinking driver fatal crash ratios.

We then sought to examine how strong versus weak dram shop liability laws impacted underage drinking driver fatal crash ratios. To do this, we conducted an ANOVA with a dichotomized law strength variable. There was a significant relationship between law strength and per capita beer consumption, $F(4, 1528) = 24.32$, $p < .001$, partial $\eta^2 = .016$, with states with strong dram shop liability laws ($M = 1.276$) averaging significantly lower per capita beer consumption than states with weak laws ($M = 1.340$). No significant relationship was found between dram shop liability law strength and underage drinking driver fatal crash ratios.

Next, we sought to examine how mandatory and voluntary RBS training laws impacted underage drinking driver fatal crash ratios and per capita beer consumption. To do this, we again conducted an ANOVA comparing the two program types. Interestingly, states with a mandatory RBS programs ($M = 0.253$) demonstrated slightly—though significantly—higher underage drinking driver fatal crash ratios than states with voluntary RBS programs, ($M = 0.252$) $F(4, 674) = 4.65$, $p = .031$, partial $\eta^2 = .007$. Similarly, states with a mandatory RBS program ($M = 1.272$) demonstrated a significantly higher rate of per capita beer consumption than states with voluntary RBS programs, ($M = 1.257$) $F(4, 674) = 4.90$, $p = .027$, partial $\eta^2 = .007$.

DISCUSSION

RBS training not only educates owners, managers, bartenders, and servers about dram shop liability, but also teaches ways to detect fake IDs and avoid serving underage patrons. Trained alcohol servers are less likely to allow underage patrons to drink in their bars (Wagenaar et al. 2005). As such, the 3.6% decrease in the fatal crash ratio of drinking drivers under age 21 in states that implemented RBS laws seems logical. What is surprising, however, is that RBS law implementation was associated with a significant 6.9% increase in per capita beer consumption. Similarly, we found that states with mandatory RBS programs were associated with increases in the underage drinking driver ratios and in per capita beer consumption compared with states with voluntary RBS training. We offer two possible

explanations for this somewhat puzzling and unexpected phenomenon: (1) states that adopt mandatory RBS training may be doing so in response to a high prevalence of underage drinking or of overservice practices, so these states have larger problems to overcome, which stimulate the passage of RBS legislation; and/or (2) many states that adopt voluntary RBS training are providing incentives for servers to attend the training, such as complementary fake ID detection machines, the ability to confiscate fake IDs, and the ability to sue an underage patron who uses a fake ID, which may enhance the effects of RBS training. More research into this finding is needed.

In this study, no relationship was found between implementation of state control of alcohol laws and either underage drinking driver FARS ratios or per capita beer consumption. Since only 11 states currently have some form of control over the retail sale of alcohol (usually distilled spirits), it is not surprising that no effects were found.

To translate our findings into practical implications, we estimated the number of lives potentially saved by each significant law. To do this, we determined the relative risk of a fatal crash for drivers based on BAC levels compared to drivers with no measurable BAC. Specifically, we determined drivers who had a BAC level of .010 to .049 to have a relative risk similar to drivers with no measurable BAC. However, drivers with BACs of .05 to .079 and those with BACs over .08 BAC were, respectively, 2.0 and 7.3 times as likely to be involved in a crash as those with no measurable BAC (Terhune et al. 1992). We then examined BAC values in the FARS crash dataset to determine the annual fatalities attributable to drivers under age 21 with a BAC above .01. Next, by examining the change in frequency of BAC-related crashes over the duration of the study, and using the unique variance explained by each law in Figure 1, we then estimated the number of lives that could potentially be saved by each law. This number was divided by the number of states that had each law. Recall that states that have adopted dram shop laws (44 and DC) and RBS training programs (37 and DC) have been associated with a significant 2.4% and 3.6% decrease, respectively, in the underage drinking driver fatal crash ratio. When adopted, dram shop laws often get substantial media coverage. Alcohol retailers are reminded that they can be sued if an underage patron that they serve injures or kills a third party in a crash. This awareness of big dram shop court cases most likely accounts for the association with a 2.4% decrease in the underage drinking driver ratio that we found. We also found that beer consumption is lower in states with strong dram shop laws. This seems plausible since a reduction in underage drinking drivers in fatal crashes in those dram shop states probably means a reduction in underage drinking, including beer.

This effort is not free of limitations. We theorize laws to have the greatest impact on fatal crash ratios immediately following their implementation when enforcement and media exposure are likely to be highest. Over time, as media campaigns end and awareness decreases, we would expect to see a dampening of law effects in these states resulting in reduced impact on FARS ratios. In addition, laws that are implemented in only a few states (i.e., state control of alcohol) may reduce the overall power available in predicting their impact on FARS ratios, thus decreasing the likelihood of finding significant results. Further, the primary outcome measure in this study involved underage drinking driver fatal crash ratios, which could be called a relatively rare and severe occurrence after consuming

alcohol. Indeed, nonfatal alcohol-related crash data would have been far more populated and may have helped to further elucidate relationships among variables not otherwise detectable. However, alcohol reporting in nonfatal crashes is incomplete and highly variable in quality from state to state; hence fatal crashes were used instead. Also, any number of variables could have a potential impact on the ratio of drinking-driver-related crashes (e.g., road conditions, geographical considerations, variations in policing policies). Although it would be ideal to measure and control for each of these variables, obtaining accurate operational measures for each would not be possible. However, because many of these unknown factors would likely also impact nondrinking-driver-related crashes, the use of a “nondrinking-driver-related crash” control condition should allow us to adjust accordingly for these potential effects. Additionally, the measure of sobriety checkpoints would ideally be an annual state-level measure similar to the other laws used in this study. However, such data was not available, so state-level data on the frequency of checkpoints in 2000 was used. Finally, while some underage drinking laws may not affect underage drinking driver ratios in fatal crashes, they could affect underage alcohol consumption, binge drinking, alcohol-fueled assaults, unintentional injuries, and suicides. These outcomes were not examined.

Despite these limitations, this research demonstrates an association of two of the three laws examined with reductions in the underage drinking driver ratios. Dram shop liability laws were associated with a 2.4% decrease in under age 21 drinking driver fatal crash ratios, while RBS training was associated with a 3.6% decrease in the ratio of underage drinking drivers to underage nondrinking drivers involved in fatal crashes. If states without dram shop and RBS training laws have a goal of reducing underage drinking driver fatal crashes, they should consider adopting these two additional laws.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This study was funded under a grant from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (R03 AA022446). The authors wish to thank Mr. Gregory Bloss of NIAAA for his guidance and suggestions during the grant process and Dr. Ralph Hingson of NIAAA for his encouragement to conduct this kind of research. We also thank the reviewers of our manuscript for their comments, suggestions, and edits.

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Figure 1.

Hypothesized structural pathways predicting beer consumption and FARS ratios. Model includes possession, purchase, consumption, internal possession, use/lose, fake ID minor, zero tolerance, furnishing, age of server, age of bartender, age of seller, fake ID retailer, social host prohibition, social host civil liability, and fake ID production. Pathways were removed for clarity but are demonstrated in Table 2.

Table 1

Minimum legal drinking age 21 (MLDA-21) law components and descriptions.

MLDA-21 Law Components	Description
Core laws that apply to youth:	
1. Possession	Illegal for youth under age 21 to possess alcohol.
2. Purchase	Illegal for youth under age 21 to purchase or attempt to purchase alcohol. Possession and purchase were treated together as the laws that met federal standards by 1988.
Expanded laws that apply to youth:	
3. Consumption	Illegal for youth under age 21 to consume alcohol.
4. Internal possession	Evidence of possession and consumption via a BAC test.
5. Use and lose	Alcohol citation for youth under age 21 results in drivers' license suspension.
6. Use of fake identification	Fake ID minor—illegal for youth under age 21 to use a fake identification to purchase alcohol.
Apply to youth driving:	
7. Zero tolerance	ZT—illegal for a driver under age 21 to have any alcohol in their system when driving.
8. Graduated driver licensing with night restrictions	GDL—youth with intermediate or provisional license prohibited from driving without an adult in the vehicle past a certain hour at night.
Apply to providers:	
9. Furnishing or selling	Illegal to furnish or sell alcohol to a youth under age 21.
10. Age of on-premise servers	Minimum age set for selling/serving alcohol.
11. Age of on-premise bartenders	Minimum age for bartenders.
12. Age of off-premise sellers	Minimum age set for selling/serving alcohol.
13. Keg registration	Identification number for beer keg and purchaser required.
14. Responsible beverage service training	RBS—responsible beverage training mandatory or voluntary.
15. Retailer support provisions for fake identification	Fake ID retailer—provisions to assist retailers in avoiding sales to youth under age 21.
16. Social host prohibition	SHP—prohibits social hosting of drinking parties with youth under age 21.
17. Dram shop liability	Action against commercial provider of alcohol.
18. Social host civil liability	Action against non-commercial (private) provider of alcohol.
Apply to manufacturers or suppliers of fake identification:	
19. Transfer/production of fake identification	Fake ID supplier—prohibits manufacturing and/or supplying fake identification to youth for the purposes of buying alcohol.
Apply to states concerning control of alcohol distribution:	
20. State control of alcohol sales	State control—a state-run retail distribution system of one or more of the alcohol beverage types.

Table 2

Regression weights and significance level for direct effects of revised model including standardized law strengths.

Predictor	Under 21 FARS ratio		Beer Consumption	
	Estimate	p-value	Estimate	p-value
<i>Latent Constructs</i>				
Economic strength	-.003	.272	-.028	<.001
Driving safety laws	-.114	<.001	--	--
Impaired driving laws	-.173	<.001	-.139	<.001
<i>Predictor Variables</i>				
Dram shop law	-.019	.018	-.021	.063
RBS law	-.049	.001	.069	<.001
State alcohol control law	.001	.940	-.007	.767
<i>Control Variables</i>				
Possession law	-.040	<.001	-.163	<.001
Purchase law	-.029	.004	-.024	.086
Consumption law	-.013	.100	.007	.556
Internal possession law	-.025	.152	.068	.006
Use/lose law	-.055	<.001	-.068	<.001
Fake ID—minor law	.014	.420	-.052	.025
Zero tolerance law	-.044	.044	-.044	.001
GDL nighttime law	-.007	.504	--	--
Furnishing law	.092	<.001	.084	.003
Age of server law	.024	.052	.035	.037
Age of bartender law	-.030	<.001	-.043	<.001
Age of seller law	.001	.962	.019	.140
Keg registration law	.129	<.001	-.189	<.001
Fake ID—retailer law	-.060	<.001	-.223	<.001
Social host prohibition law	.015	.266	-.032	.085
Social host civil liability law	-.018	.028	.015	.184
Fake ID—production law	-.003	.696	.057	<.001
<i>Intermediate Variables</i>				
Beer consumption	.196	<.001	--	--

Note: $\chi^2 = 13889.958$, $p < .001$; CFI = 0.25, NFI = 0.24, RMSEA = .150

Table 3

All effects of dram shop liability, responsible beverage service, and state control laws on under 21 FARS ratios.

Law	Direct Effects	Indirect Effects ^I	Total Effects
Dram shop liability law	−1.9%	−0.4%	−2.4%
Responsible beverage service law	−4.9%	1.4%	−3.6%
State alcohol control law	0.1%	−0.1%	0.0%

^I Indirect effects include beer consumption as an intermediate variable.