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Measuring the Strength of State-Level Alcohol Control Policies

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Abstract

Purpose—We describe a multi-step method of coding the strength of 18 alcohol policies included in the Alcohol Policy Information System for each of the 50 states.

Method—After thoroughly reviewing each policy area, we chose components that were most important in categorizing the strength or restrictiveness of the policy using the following criteria: overall reach, enforceability, and implementation. We determined a unique coding scheme for each policy area.

Results—The total number of categories per policy area ranged from two to six, with categories numbered in an ordered sequence from least to most restrictive. We provide three examples of our coding schemes: Keg Registration, Underage Possession, and Sunday Sales. We also rank the states on their alcohol policy sum score.

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Discussion—This study demonstrates how alcohol policies can be measured quantitatively, an important step for assessing the effects of alcohol policies on various outcomes.

Keywords

alcohol; policy; measurement

Introduction

Alcohol use is associated with a wide array of health and social problems, such as traffic crashes (NHTSA 2013), violent crime (Felson & Staff 2010; Miller et al. 2006), increased health care costs from alcohol-related disease and injury (Mokdad et al. 2004), and lost employee productivity (Harwood 2000; Zaloshnja et al. 2007). Nationally, total alcohol-related costs in the U.S. are estimated to be approximately $224 billion per year and the median state costs are $2.9 billion (Bouchery et al. 2011; Sacks et al. 2013). Given shortages of financial resources for basic infrastructures in many states as well as rising costs of healthcare, it is critical that we identify effective methods for reducing costs associated with alcohol use at the local, state, and national levels.

A range of state-level policies have been identified to target population-level rates of alcohol use, such as alcohol excise taxes, restricting days of alcohol sales, and the minimum legal drinking age (MLDA). There is strong research evidence that many individual alcohol policies can influence alcohol use and related problems (Babor et al. 2010). Many previous studies assessed effects of state-level alcohol policies by simply measuring a policy as dichotomous (i.e., “present” or “not present” (e.g., Cohen, Mason & Scribner 2002; Stout et al. 2000; Whetten-Goldstein et al. 2000). However, a given type of alcohol policy may vary significantly across states or other jurisdictions. For example, each state has some form of an age-21 MLDA, but the potential strength of the MLDA laws varies by state (Fell et al. 2009). The variability in strength of a policy type may result in different levels of effectiveness across states.

A few studies have assessed the variability of specific policy types across states. Mosher and associates (2002) assessed the strength of 23 state responsible beverage service (RBS) training laws. They compared each law to a model policy developed through a review of research literature, theory, and expert opinion. They assessed five components of the RBS laws: program requirements, administrative requirements, enforcement provisions, penalties for lack of compliance, and benefits. They evaluated how many of the components were specified in the law as well as rated each component (e.g., the program component could be rated from a 1 for minimal program requirements to a 5 for specification of an intensive, theoretically-based training program). Strength of RBS laws varied by state. Two states had high scores; however RBS legislation was weak across most other states (e.g., overall scores for mandatory RBS laws ranged from 6 to 16 out of 17 points). They did not specifically assess how the strength of RBS laws may have affected alcohol-related problems; however, a study of one of the strongest RBS laws identified through their evaluation—Oregon’s—found that this law was associated with a significant reduction in fatal traffic crashes (Holder & Wagenaar 1994).

Fell and associates (2008) used a similar process to assess the strength of the core U.S. MLDA laws as well as 14 companion laws (e.g., keg registration, blood alcohol content limits for underage drivers). They developed a scoring system for each type of policy, with points assigned in each state for provisions of the law that would discourage alcohol use among youth. Points were subtracted for provisions that increased the likelihood of youth drinking. They also found large variability in the strength of laws across states.

More recently, Naimi and associates (2013) used a different method to assess what they called implementation ratings for 29 state-level alcohol policies. The implementation ratings measured the strength of the policies in terms of several provisions, including whether the policy was broadly applicable and enforceable. Each policy was given an implementation rating scale for each state and each study year ranging from 0.0 (no policy) to 1.0 (full implementation). A modified Delphi approach, using a panel of 10 alcohol policy experts, was used to assist with development of these ratings. Experts on specific policies were first consulted to help develop the rating scale for each policy. Each policy scale was then reviewed by all 10 expert panelists; scales were adjusted based on their feedback. They found that implementation ratings for specific policies varied both across state and time. They created multiple aggregate measures of the 29 alcohol policies for each state.

In this study we describe another method used to code the strength or restrictiveness of 18 types of state alcohol policies included in the Alcohol Policy Information System (APIS), an online alcohol policy tracking system (http://alcoholpolicy.niaaa.nih.gov/) funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). We describe our multi-stage in-depth process and provide examples of this method for several policies. We also combine policies to create an overall policy environment score for each state, and rank states based on their policy score. Results from this coding process, along with previous similar studies, can be helpful to governments considering adopting a wide range of alcohol policies to alter the alcohol environment in their cities.

Methods

We examined all policies included in the APIS database with the exception of those pertaining to Pregnancy and Alcohol, Vehicular Insurance, and Health Care Services and Financing, which were outside the scope of the primary study. We analyzed APIS policy data from 2009. In total, we examined 18 types of alcohol policies (Table 1).

Our research team, consisting of several leading experts in alcohol policy, examined the policy areas using a group process. Our goal was to determine a coding scheme for each policy area, in order to determine its strength or restrictiveness across each of the 50 states. We aimed to categorize states on a scale from “most restrictive” to “least restrictive” for each of the policy areas. The “most restrictive” category includes the states that have laws and legal provisions that place the greatest limits on the sale/use of alcohol via mechanisms particular to a given policy (e.g., reducing the availability of alcohol, influencing the circumstances under which alcohol can be purchased, consumed or possessed). The “least restrictive” category includes states that have the weakest such provisions, or in some cases, no provisions at all; any middle categories fall between these two extremes.

The first step of this process was to gain a thorough understanding of the APIS data available for each policy area. We downloaded data from APIS, reviewed language of specific laws, and consulted relevant experts and other resources (e.g., Westlaw, Lexis-Nexis) as needed to better understand the meaning and implications of each policy area and its various components. Some policy areas had very few components (e.g., Sunday Sales) while others had many (e.g., Keg Registration). For some of policy areas that had many components, we created a flow chart to better understand all components and possible combinations of components. In some of these cases we also constructed a frequency table of the components to examine the variability of each component across states and the possible patterns of components. We also reviewed relevant literature when available.

Once we had a firm grasp on a policy area and all its components as outlined in APIS, we chose the components that would be most important in categorizing the restrictiveness of a particular policy. For some policy areas all components were retained while for others we eliminated some components based on lack of variability and/or lack of potential impact on a policy's restrictiveness. We next began to define categories based on these components from least to most restrictive. Each state was then placed in one of the categories for each policy area. To determine these categories we considered how the components of a particular policy may affect the policy's: (1) overall reach (e.g., how many people are affected); (2) enforceability (e.g., does it allow for specific enforcement actions); and/or (3) implementation. We resolved differences in opinion by getting input from our consultants and reviewing the research literature as needed. Once the team was in agreement on a coding scheme for each policy type, we asked our consultants to review the coding, along with full descriptions of the process, and provide feedback. Only minor changes were made in the descriptions of our coding based on this feedback.

Following creation of the categories or coding scheme for each policy area, we then created an alcohol policy environment sum score for each state. We first collapsed some coding categories for three of the policy areas (underage consumption, underage internal possession, control systems) due to a small number of states (1-2) in these categories (Table 1). We then created sum scores by summing the score for each of the 18 policy areas for each state, first using raw codes for each policy area and second using standardized scores (mean = 0, standard deviation = 1).

Results

The total number of categories per policy area ranged from two to six—the most complex and variable policies had greater number categories, while the least complex had only two (policy present or not). Categories were numbered in an ordered sequence, with the least restrictive category being category 1. For the three BAC policies (adult, youth, boating), we found no meaningful variability across states, preventing us from creating a policy coding scheme for these policy areas (Table 1).

We determined a unique coding scheme for each policy area; however, there are some similarities across policy areas. For example, for a small number of policies (e.g., keg registration) we determined a threshold of restrictiveness, where a policy needed to have a

specific set of components to meet this threshold. For several policies that pertained to prohibition of a behavior (e.g., underage alcohol consumption), we created categories based on the exceptions to this prohibition (e.g., underage alcohol consumption allowed in parents' home).

Below we provide three examples of our coding schemes—Keg Registration, Underage Possession, Sunday Sales—each illustrating a different type of coding scheme.

Example 1: Keg Registration

The coding scheme for keg registration involved the threshold method, as mentioned above. We used this same type of coding scheme for the policy Hosting Underage Drinking Parties.

Keg registration policies cover laws specifying requirements for the sale or purchase of beer kegs. These laws require wholesalers or retailers to attach a tag, sticker, or engraving with an identification number to kegs (and/or taps). At purchase, the retailer records identifying information about the purchaser. If it is determined that underage youth consumed beer from the keg, the tag can help identify the purchaser in order to hold them liable for providing alcohol to underage youth. Some states require a deposit that is refunded when the keg and/or tap are returned with the identification number intact. In some states, keg laws specifically prohibit destroying or altering the identification tag and other states make it a crime to possess an unregistered or unlabeled keg.

In coding this policy, we primarily considered the enforceability of the policy (i.e., if law enforcement could identify and charge adults who provide alcohol to underage youth) and how well the policy would likely deter persons from providing alcohol to underage youth. At the two extremes of restrictiveness, the least restrictive states are clearly those that have no keg registration law (n=19 states; Table 2; Figure 1), and the most restrictive is the one state that bans beer kegs altogether (Utah).

We coded the remaining 30 states that have a keg registration law based on if certain core components were in place to make the policy function (i.e., met the minimum threshold). We identified three components which we assessed as necessary for the law to function as far as tracking a keg and issuing penalties if it is a source of alcohol for underage persons: (1) requires retailer to record the name and address and/or identification number from the purchaser's identification card (to track purchaser if needed); (2) prohibits destroying the identification tag and/or made it illegal to possess an unregistered or unlabeled keg (to allow law enforcement to impose penalties if tag is tampered with); and (3) the state's definition of a keg includes 8 gallons (so that the majority of large beer containers are covered under the policy). Eight of the 30 states did not meet the threshold of these three components (sub-threshold; category 2). Nineteen of the 30 states had policies that met the threshold (category 3), and an additional three states met the requirements and also required a deposit of $25 or more which we placed in category 4 (a deposit may provide incentive to return a keg but we decided that a deposit under $25 would not provide enough incentive to include those states in this category).

Some states have additional components including: (1) collecting information about where the keg is to be consumed, (2) requiring retailers to provide warning information at the time of purchase about laws prohibiting provision of alcohol to those under age 21, or (3) includes or exempts disposable kegs. Although these components may assist law enforcement and increase deterrence in providing alcohol to underage, we decided these components were not as essential based on the following rationale: (1) purchasers could easily provide false information about where the keg was to be consumed to avoid tracking of the keg; (2) warnings are easily ignored or not read/heard; (3) disposable kegs are typically small enough (similar quantity to a case of beer) that the increased risk seen with regular kegs is not present and disposable kegs are also less likely to be as prevalent as standard kegs.

Example #2: Underage Alcohol Possession

Underage alcohol possession is an example of a policy area that prohibits a behavior, with some states allowing exceptions to this prohibition. We describe in detail the coding for underage alcohol possession policy area; however, we used a similar type of coding scheme for the following policy areas: underage alcohol consumption, internal possession of alcohol and furnishing alcohol to underage.

All states prohibit possession of alcoholic beverages by those under age 21 but some states have one or more exceptions. There are two primary types of exceptions: allowing possession with consent or presence of a parent/guardian and/or spouse; allowing possession in certain locations which may include: (1) all private locations, (2) private residences only, or (3) the home of the parent/guardian only. Some states have policies where family and location exceptions are applied in combination, for example: possession is allowed with parental consent if possession occurs in the parents' home (but parental consent does not apply elsewhere).

In coding this policy area, we considered both the reach of the policy (how many persons would be affected and in how many situations) and its enforceability to prevent/reduce underage drinking. We also took into consideration that the most common situations for underage drinking are likely parties or gatherings with friends that are unsupervised by parents.

We created five categories for this policy area. We first decided that the most restrictive policy is when alcohol possession was prohibited for all underage persons with no exceptions (19 states; Table 3), as this policy affects all underage persons in all situations and a policy with no exceptions is easier to enforce. To code the remaining 31 states, we considered which exceptions were most restrictive (Table 3; Figure 2). For parsimony, we generally considered the two family exceptions together (parent/guardian and spouse) because no state had a spouse exception without parent/guardian exception, and we decided it is relatively uncommon for an underage person to have an of-age spouse (for simplification, we refer to "parent/guardian and/or spouse" as "parent" and "present or consent" as "consent").

The 31 states were grouped into four categories. Category 4 includes the four states that allow possession only in the parent's home (either with or without parental consent) because in this case youth cannot possess alcohol with friends or at parties or other locations other than their own home. Category 3 includes the eight states that have family and private location exceptions (other than parents' home) in combination—underage youth can possess outside their own home but only when with parental consent *and* if in a private residence or other private location. In this case possession would not be allowed at underage drinking parties except those in private locations and when the parents of all youth attending provide consent. The last two categories allow possession outside the home but only one condition must be met. Eleven states allow possession if parents are consenting regardless of the location (category 2); this allows youth to possess alcohol in any public or private location as long as their parents consent, yet this still prohibits underage drinking gatherings unless the parents of all the youth attendees consent. Finally, the eight states in category 1 allow possession in any private location without the need for parental consent—this allows possession at any private party or gathering of friends, without any need for parents to be present or have knowledge of the alcohol possession.

Example #3: Sunday Sales

Sunday Sales is an example of a policy area where the coding scheme was quite straightforward with only a few categories. Although it also entails prohibition of a behavior with some states having exceptions, the exceptions are fairly limited.

This policy area covers laws banning Sunday sales of alcoholic beverages for off-premises consumption (as of 1/1/2009, no states ban Sunday sales for on-premises consumption). Bans on Sunday sales first appeared prior to the Revolutionary War as part of the colonies' blue laws (so called because they were published on blue paper in some colonies); pre-Revolutionary blue laws prohibited breaking the Sabbath by working, shopping, or consuming alcohol on Sundays. Enforcement of these laws declined after the American Revolution but regained momentum during the temperance movement leading up to Prohibition. Bans on Sunday sales reappeared in many States after the repeal of Prohibition, in some cases because the preexisting bans from the temperance era had never been repealed.

In coding this policy area, we primarily considered the reach of the policy regarding restricting the availability of alcohol. We first created category 1—states that do not ban any types of Sunday sales of alcohol were the least restrictive states (n=34; Table 4; Figure 3). The remaining 16 states have some type of Sunday sales ban. Three of these states have the most restrictive policy—a ban on off-premise sales of *all* types of alcohol with no exceptions (category 3). Thirteen states have some prohibition of Sunday sales (e.g., sales prohibited for some type of beverages or at some stores) and we placed these in a middle category (category 2).

Creating and Using Alcohol Policy Environment Sum Score

After coding each of the 18 policies, we ranked each state in terms of their alcohol policy environment to determine how well the coding scheme captured differences in the alcohol

policy environment across states. Table 5 includes the raw and standardized sum scores for each of the fifty states, ranked from highest to lowest by the standardized scores. Standardized scores range from 20 to -11. Utah, North Carolina, and Alabama have the highest standardized scores (indicating the more restrictive policy environments), and Delaware, New York, and Kentucky have the lowest standardized scores (indicating the least restrictive policy environments).

Discussion

Our study illustrates that the state-level alcohol policy environment can be measured, adding to a growing literature of studies designed to measure a broad set of alcohol policies across states. This is an extremely important step. As with any construct of interest, establishing good measurement is necessary in order to then study how that construct relates to exposures and outcomes, ideally in causal models. It is particularly important with alcohol policies, as work is needed to improve measurement at both the individual policy level and the aggregate policy environment level.

Two specific aspects of our approach to measuring the state-level alcohol policy environment warrant elaboration. First, our measures of individual policies go beyond simplistic measures of policy/no policy. For the vast majority of alcohol policies, each policy is comprised of multiple components, each affecting the strength, reach, and/or enforceability of the policy. As a result, wide variability exists even among states that have a policy, and this variability may be as important as the difference between having a policy and not having a policy. Second, there is growing consensus that examining policies individually is also an oversimplification (Fell et al., 2009; Mosher et al., 2002; Naimi et al., 2013). Alcohol use and misuse are complex behavioral phenomena and have a multitude of causes and/or modifiers. Even focusing just on the ecological effects, many factors affect behaviors. When focusing on preventing alcohol-related consequences, this etiologic complexity suggests that a single, “silver bullet” approach is unlikely to lead to a significant reduction in problems. This is consistent with community-based, environmental intervention studies, where the most successful interventions have been those that focused on multiple environmental factors and sought to affect multiple policies instead of just one or two (e.g., Flewelling et al., 2013; Holder et al., 2000).

The aggregate sum scores provide a first glimpse at an attempt to combine all of the strength-coded policies into a single measure. Although it is not surprising that Utah had the highest score (on both the raw sum score and the standardized sum score), the distance to the next highest state is somewhat surprising. It is clear that Utah has an overall much stronger alcohol policy environment, and that this exists across a wide variety of alcohol policies as opposed to just one or two. The other states with strong alcohol policy environments are also not surprising—Kansas, North Carolina, South Carolina and Alabama, all also known for having fairly strong alcohol policies, are all in the top five. Similarly, the states that scored low on the alcohol policy environment are known, at least anecdotally, as states that have less alcohol restrictions. The range in scores is also noteworthy. One possible prediction is that the policies would ‘average out’ and all of the states would cluster around the mean. Although that is somewhat the case, with just under half (n=24) of the states scoring

between 32 and 36 on the raw sum score, there is also a large enough spread between the lowest scoring quartile of states and the highest scoring quartile of states that suggests that there is likely enough variability to study and evaluate.

The rationale and merits of creating a measure of the overall alcohol policy environment may be straightforward, but the process is anything but. The first issue was accommodating the varying number of ordered categories used across the 18 individual policies. Summing policies with differing numbers of categories produces the effect of overweighting policies with more categories while underweighting policies with fewer categories. To combat this, we chose to standardize each individual policy (mean=0, standard deviation=1) and sum the standardized scores. This produces an aggregate score that equally weights each policy, regardless of the number of categories. This equal weighting is also a potential drawback, as it assumes each policy in the aggregate score is equally strong or effective, when in fact some policies likely have little or no association with an outcome (e.g., binge drinking) and other policies may have moderate or strong associations. To accommodate this variability, a second set of weights could be used. This is similar to the approach by Naimi and colleagues (2013) who used ‘implementation ratings’ based on expert opinion to differentially weight the policies. Two important considerations are how best to estimate these weights (e.g., expert opinion, theory, empirically) and how the weights are outcome-dependent. Another approach is to look for natural clusters or patterns of policies across states and determine if these patterns are differentially associated with outcomes of interest. A number of modern statistical models have been developed for these purposes (e.g., latent class analysis, mixture regression), and we are currently exploring these models with these data.

Importance of APIS

Our research highlights the importance of the Alcohol Policy Information System (APIS) as a research tool for assessing the impact of alcohol policy. Developed and maintained by NIAAA, APIS represents a pioneering effort to develop a cross-disciplinary methodology for studying laws and regulations in a manner suitable for conducting quantitative and qualitative social science research. The challenges are daunting. For purposes of social science research, a framework that includes specific variables needs to be developed that can be applied to laws across multiple jurisdictions. Yet legal research focuses on the peculiarities of particular legal provisions—challenging variable definitions and structures. In essence, social science wants to simplify the complexity found in the law, while legal researchers focus on that complexity and resist simplification.

APIS represents a successful collaboration of these two research traditions. Social scientists and legal researchers team to develop the policy variables, which are tested and retested through the legal research process. Now in its twelfth year, the lessons learned have been generalized for application in other areas of public health (Anderson, Tremper & Thomas, 2013; Tremper, Thomas & Wagenaar, 2010). Prior to APIS being available, many alcohol policy studies essentially avoided the challenges of legal research by using dichotomous variables—either the law exists or it does not, without examining the complexity within the laws that may make one version more effective than another. As our study has shown, this level of simplification can lead to problematic interpretations of results. In short, our

research could not have been accomplished without a resource such as APIS that provides the basic legal data on the policies being studied in a manner suitable for social science research.

Limitations

The current study has a number of limitations to consider. First, the study is cross-sectional, using just one ‘snapshot’ of alcohol policies to develop and test a measure. Ideally this work can be replicated with more time points to cross-validate the model results. The fact that the policies tend to change little over years, coupled with the recency of the APIS website, suggests this important work may not be possible for a while, until a sufficient number of years of data has been collected. Second, the policies were coded in such a way that, although ordinality in the policy codings was almost always straightforward, equality of intervals was not able to be addressed. Moving from not having any Sunday alcohol prohibitions (coded as 1) to having some prohibition with exceptions (coded as 2) is likely not “equal” in terms of policy strength change as moving from prohibition with exceptions (coded as 2) to full prohibition (coded as 3). Despite the policy codings likely not being interval variables, the aggregation technique makes this assumption. Third, not all recognized state-level alcohol policies could be included, primarily because for some policies there was no variability across states during this study year (e.g., all states had equal drunk-driving Adult BAC per se levels of 0.08 g/dL). Finally, the current analyses do not include an outcome (e.g., state binge drinking rate, alcohol-related fatalities). Future work establishing associations between the alcohol policy environment measure and expected correlates is important both to establish validity of the policy measure as well as begin to test hypotheses linking the overall alcohol policy environment to a wide array of alcohol use and alcohol-related consequences outcomes.

Conclusions and Policy Implications

Despite these limitations, the current study adds to and complements a growing literature designed to better understand and measure the alcohol policy environment. The study highlights key components of particular policies, offering a practical guide for advocates and legislators regarding how a law should be drafted to maximize its beneficial public health and safety outcome. The policy process often involves negotiations regarding the specific provisions and language to be included in the proposed law. In many cases, advocates accede to amendments and revisions that appear to be minor revisions but in fact may substantially undermine the law’s effectiveness. For example, for keg registration laws, alcohol retailers might seek to remove provisions requiring that they record the purchaser’s name and address or provisions making it illegal to possess a keg without a label. Our assessment can help guide both policy makers and advocates regarding how to respond—knowing that the first is a critical component of the law while the second is more negotiable.

References

Anderson, Evan D.; Tremper, Charles; Thomas, Sue; Wagenaar, A.; Burris, S. Public Health Law Research: Theory and Methods. Jossey Bass; San Francisco: 2013. Measuring Statutory Law and Regulations for Empirical Research; p. 237-260.

Babor, Thomas F.; Caetano, Raul; Casswell, Sally; Edwards, Griffith; Giesbrecht, Norman; Grahm, Kathryn; Grube, Joel W.; Hill, L.; Holder, Harold; Homel, Ross; Livingston, Michael; Österberg, Esa; Rehm, Jurgen; Room, Robin; Rossow, Ingeborg. Alcohol: No Ordinary Commodity: Research and Public Policy. 2nd. Oxford University Press; Oxford: 2010.

Bouchery, Ellen E.; Harwood, Henrick J.; Sacks, Jeffrey J.; Simon, Carol J.; Brewer, Robert D. Economic Costs of Excessive Alcohol Consumption in the US, 2006. American Journal of Preventive Medicine. 2011; 41(5):516–524. [PubMed: 22011424]

Cohen, Debra A.; Mason, Karen; Scribner, Richard. The population consumption model, alcohol control practices, and alcohol-related traffic fatalities. Preventive Medicine. 2002; 34(2):187–197. [PubMed: 11817914]

Fell, James C.; Fisher, Deborah A.; Voas, Robert B.; Blackman, Kenneth; Tippetts, A. Scott Changes in Alcohol-Involved Fatal Crashes Associated With Tougher State Alcohol Legislation. Alcoholism-Clinical and Experimental Research. 2009; 33(7):1208–1219.

Fell, James C.; Fisher, Deborah A.; Voas, Robert B.; Blackman, Kenneth; Tippetts, A. Scott The Relationship of Underage Drinking Laws to Reductions in Drinking Drivers in Fatal Crashes in the United States. Accident Analysis and Prevention. 2008; 40:1430–1440. [PubMed: 18606277]

Felson, Richard B.; Staff, Jeremy. The Effects of Alcohol Intoxication on Violent Versus Other Offending. Criminal Justice and Behavior. 2010; 37(12):1343–1360.

Flewelling, Robert. L.; Grube, Joel W.; Paschall, MJ.; Biglan, Anthony; Kraft, Anne; Black, Carol; Hanley, Sean M.; Ringwalt, Christopher; Wiesen, Chris; Ruscoe, Jeff. Reducing Youth Access to Alcohol: Findings from a Community-Based Randomized Trial. American Journal of Community Psychology. 2013; 51(1-2):264–277. [PubMed: 22688848]

Harwood, Henrik J. Updating Estimates of the Economic Costs of Alcohol Abuse in the United States: Estimates, Update Methods, and Data. National Institute on Alcohol Abuse and Alcoholism; Rockville, Maryland: 2000.

Holder HD, Gruenewald Paul J. Ponicki William R. Treno Andrew J. Grube Joel W. Saltz Robert F. Voas Robert B. Reynolds Robert, Davis Johnetta, Sanchez Linda, Gaumont George, Roeper Peter. Effect of community-based interventions on high-risk drinking and alcohol-related injuries. Journal of the American Medical Association. 2000; 284(18):2341–2347. [PubMed: 11066184]

Holder, Harold D.; Wagenaar, Alexander C. Mandated Server Training and Reduced Alcohol-Involved Traffic Crashes: A Time Series Analysis of the Oregon Experience. Accident Analysis and Prevention. 1994; 26(1):89–97. [PubMed: 8110360]

Miller, Ted R.; Levy, David T.; Cohen, Mark A.; Cox, Kenya L. C. Costs of Alcohol and Drug-Involved Crime. Prevention Science. 2006; 7(4):333–342. [PubMed: 16845591]

Mokdad, Ali H.; Marks, James S.; Stroup, Donna F.; Gerberding, Julie L. Actual Causes of Death in the United States, 2000. The Journal of the American Medical Association. 2004; 291(10):1238–1245.

Mosher, James F.; Toomey, Traci L.; Good, Charles; Harwood, Eileen; Wagenaar, Alexander C. State Laws Mandating or Promoting Training Programs for Alcohol Servers and Establishment Managers: An Assessment of Statutory and Administrative Procedures. Journal of Public Health Policy. 2002; 23(1):90–113. [PubMed: 12013719]

Naimi, Timothy S.; Blanchette, Jason; Nelson, Toben F.; Nguyen, Thien; Oussayef, Nadia; Heeren, Timothy C.; Gruenewald, Paul; Mosher, James; Xuan, Ziming. A New Scale of the U.S. Alcohol Policy Environment and Its Relationship to Binge Drinking. American Journal of Preventive Medicine. 2013; 46(1):10–16. [PubMed: 24355666]

National Highway Traffic Safety Administration. Traffic Safety Facts 2011. U.S. Department of Transportation; Washington D.C.: 2013.

Sacks, Jeffrey J.; Roeber, Jim; Bouchery, Ellen E.; Gonzales, Katherine; Chaloupka, Frank J.; Brewer, Robert D. State Costs of Excessive Alcohol Consumption, 2006. American Journal of Preventive Medicine. 2013; 45(4):474–485. [PubMed: 24050424]

Stout, Emily M.; Sloan, Frank A.; Liang, Lan; Davies, Hester H. Reducing Harmful Alcohol-Related Behaviors: Effective Regulatory Methods. Journal of Studies on Alcohol. 2000; 61(3):402–412. [PubMed: 10807211]

Tremper, Charles; Thomas, Sue; Wagenaar, Alexander C. Measuring law for evaluation research. Evaluation Review. 2010; 34:242–266. [PubMed: 20479214]

Whetten-Goldstein, Kathryn; Sloan, Frank A.; Stout, Emily; Liang, Lan. Civil Liability, Criminal Law, and Other Policies and Alcohol-Related Motor Vehicle Fatalities in the United States: 1984-1995. Accident Analysis and Prevention. 2000; 32(6):723–733. [PubMed: 10994599]

Zaloshnja, Eduard; Miller, Ted R.; Hendrie, Delia; Galvin, Deborah. Employer Costs of Alcohol-Involved Injuries. American Journal of Industrial Medicine. 2007; 50(2):136–142. [PubMed: 17187380]

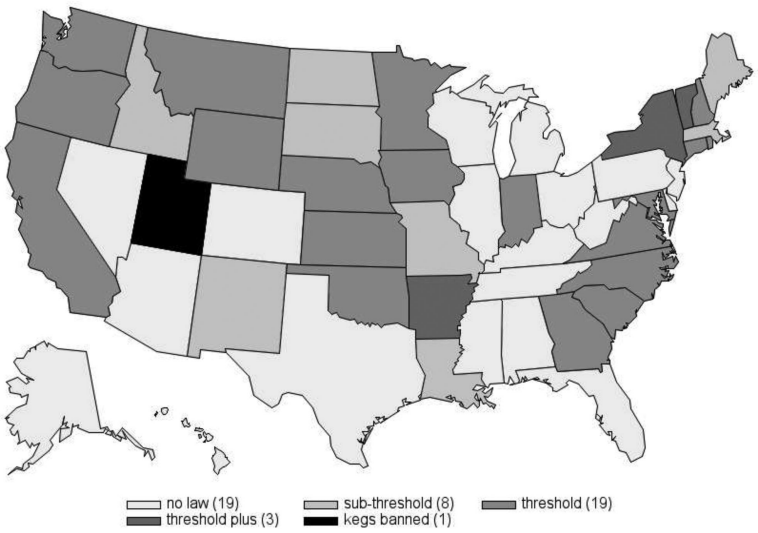

Figure 1.
Keg Registration

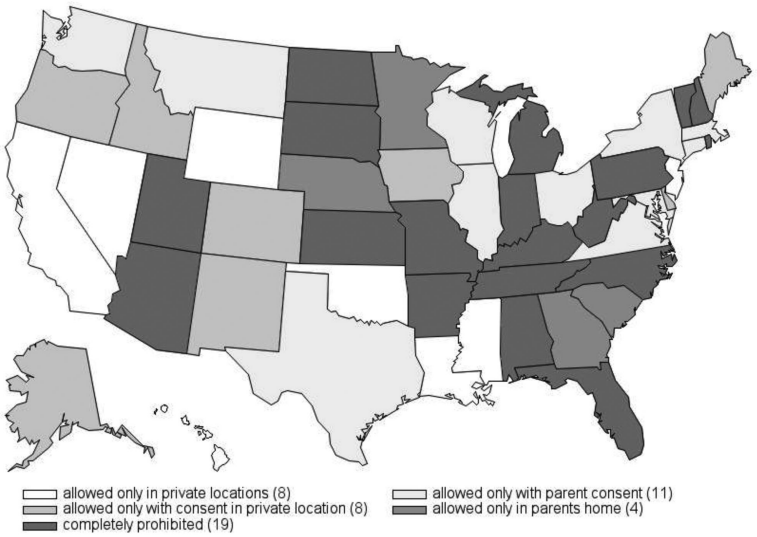

Figure 2.
Underage Alcohol Possession

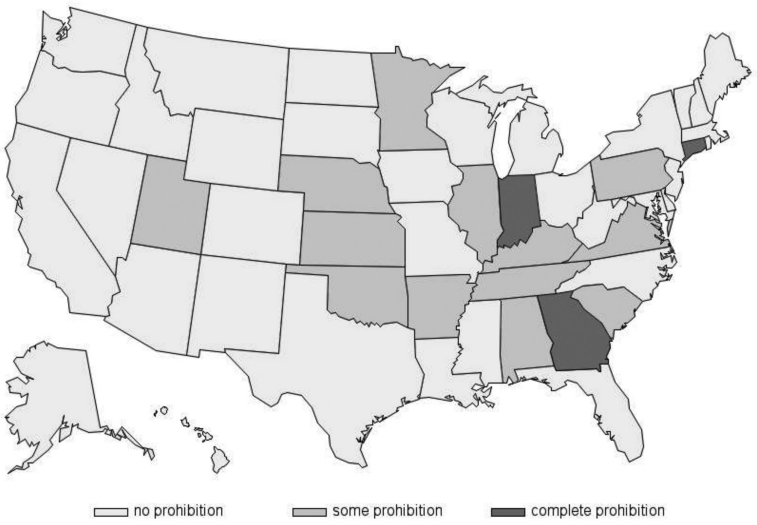

Figure 3.
Sunday Sales

Table 1

APIS policy areas examined and number of coded categories

Policy Area	Number of original categories	Number of categories for sum score
Beer taxes	3	3
Underage: possession	5	5
Underage: consumption	6	4
Underage: internal possession	3	2
Underage: purchasing	2	2
Underage: furnishing	3	3
Age of server: on-premise	4	4
Age of server: off-premise	4	4
Use/Lose: Driving privileges	4	4
Hosting underage drinking parties	4	4
False identification[1]		
Users	2	2
Suppliers	2	2
Retailers	3	2
Adult BAC[2]	--	--
Youth BAC[2]	--	--
Boating BAC[2]	--	--
Open Container	2	2
Keg registration	5	5
Beverage service training	4	4
Sunday sales	3	3
Control system	5	3

[1] Three separate 2-category policies were created for users, retailers, suppliers.

[2] No meaningful variability across states

Table 2

Keg Registration: Coding

Code	Description of Code	Number of states
1	No keg registration policy	19
2	*Sub-threshold*: Has keg registration policy that does not meet the threshold of three core components	8
3	*Threshold*: has keg registration policy that meets the threshold of three core components (but does not require deposit of $25 or more)	19
4	*Threshold plus*: has keg registration policy that meets the threshold and also requires a deposit of $25 or greater	3
5	Bans kegs completely	1
	Total	50

Table 3

Underage Possession: Coding

Code	Description of Code[1]	Number of states
1	Possession allowed in private location (no parental consent needed)	8
	-in any private location (7)	
	-in a private residence (1)	
2	Possession allowed with parental consent (any location)	11
3	Possession allowed with parental consent if in a private location	8
	-in a private residence (5)	
	-in any private location (3)	
4	Possession allowed in parent's home	4
	-with parental consent (1)	
	-without parental consent (3)	
5	Possession Illegal, no exceptions	19
	Total	50

[1] number in parentheses are number of states in sub-categories

Table 4

Sunday Sales: Coding

Code	Description of Code	Number of states
1	No prohibition of Sunday sales	34
2	Some prohibition of Sunday sales	13
3	Sunday sales prohibited, no exceptions	3
	Total	50

Table 5

State Rankings by Policy Sum Scores (sorted by standardized scores)

State	Raw sum score	Standardized sum score
UT	51	20.0346
NC	42	11.0000
AL	44	10.6503
KS	43	8.4630
SC	40	8.3359
IN	44	7.6648
ME	39	5.9168
PA	40	5.7146
NH	39	5.2610
OK	38	5.0355
WA	39	4.8522
CO	36	4.0370
MI	36	3.3747
AK	38	2.8577
ID	35	2.6896
CA	35	2.3491
MN	34	2.0440
RI	36	1.7867
GA	34	1.3179
TN	36	1.1362
AR	36	0.6511
OR	36	0.2678
AZ	36	0.0749
SD	35	−0.8168
IL	32	−0.9979
NM	35	−1.0178
OH	32	−1.6218
VA	34	−1.6874
HI	33	−1.7130
NE	33	−2.1434
FL	33	−2.4026
ND	35	−2.4585
MD	33	−2.7395
MO	33	−2.9573
MT	31	−3.0203
VT	36	−3.6824
IA	30	−3.8443
WI	29	−4.0794

State	Raw sum score	Standardized sum score
LA	31	−4.0992
NV	31	−4.4932
MA	30	−4.7039
WY	32	−5.3285
NJ	28	−5.6852
CT	29	−6.6118
TX	28	−6.9039
WV	30	−7.1038
MS	29	−7.2634
KY	28	−7.8611
NY	29	−9.1320
DE	31	−11.1473