

Alcohol Policies in U.S. States, 1999–2018

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ABSTRACT. Objective: U.S. policymakers and public health practitioners lack composite indicators (indices) to assess and compare the restrictiveness of state-level alcohol policy environments, conceptualized as the presence of multiple policies in effect in a particular place and time. The purposes of this study were to characterize the alcohol policy environment in each U.S. state and Washington, DC, in 2018, and to examine changes during the past 20 years. **Method:** State-specific Alcohol Policy Scale (APS) scores from 1999 to 2018 were based on 29 policies, after weighting each present policy by its efficacy and degree of implementation. Modified APS scores were also calculated on the basis of two sets of mutually exclusive policy subgroups. **Results:** APS scores in 2018 varied considerably between states, ranging from 25.6 to 67.9 on a theoretical scale of 0 to 100; the median score was

43.5 (based on a 0–100 range), and 43 states had scores less than 50. The median change in state APS scores from 1999 to 2018 was positive (+4.9, range: -7.4 to +10.3), indicating increases in the restrictiveness of policy environments, with decreases in only five states. The increases in APS scores were primarily attributable to the implementation of stronger impaired-driving laws, whereas policies to reduce excessive drinking were unchanged. There was no correlation between states' excessive-drinking policy scores and their impaired-driving scores ($r = .05$, $p = .74$). **Conclusions:** Based on this policy scale, few states have restrictive policy environments. Although states adopted policies targeting impaired driving during the study period, there was no change in policies to reduce excessive drinking. (*J. Stud. Alcohol Drugs*, 81, 58–67, 2020)

EXCESSIVE ALCOHOL CONSUMPTION is the third leading preventable cause of death in the United States and causes approximately 88,000 deaths annually, with an average of 29 years of life lost per alcohol-attributable death (Centers for Disease Control and Prevention, 2014; Mokdad et al., 2004). Excessive consumption is a risk factor for unintentional injuries, violence, liver disease, stroke, dementia, hypertension, several types of cancer, sexual assault and sexually transmitted infections, fetal alcohol spectrum disorders, and alcohol use disorder (Corrao et al., 2004; Gladstone et al., 1996; Iyasu et al., 2002; Midanik et al., 2004; National Institute on Alcohol Abuse and Alcoholism, 2000; Nelson et al., 2013a; Room et al., 2005; Thun et al., 1997). Excessive alcohol use in the United States cost \$229 billion in 2010, or \$807 per adult (approximately \$2.05 per standard drink) for health care, productivity losses, and other effects (e.g., property damage), 40% of which was borne by federal and state governments (Sacks et al., 2015). Excessive drinking was defined as binge drinking (4 or more drinks per episode

for a woman and 5 or more drinks per episode for a man) or heavy drinking (more than 7 drinks per week for a woman and more than 14 drinks per week for a man) (National Institute on Alcohol Abuse and Alcoholism, 2004).

All states have multiple alcohol control policies. Some policies are more effective than others to reduce alcohol consumption and related harms (Campbell et al., 2009; Elder et al., 2010; Hahn et al., 2010; Middleton et al., 2010; Nelson et al., 2013b; Rammohan et al., 2011; Shults et al., 2001). In addition, the alcohol policy environment (conceptualized as the presence of multiple policies in effect in a particular place and time) has been shown to be associated with state- and individual-level drinking patterns as well as alcohol-impaired driving (Brand et al., 2007; Naimi et al., 2014; Nelson et al., 2005; Shults et al., 2002). Composite indicators can support decision makers by summarizing complex or multidimensional issues in order to provide a big-picture view, benchmark jurisdictions, and identify trends over time (Nardo et al., 2005; Ritter, 2007). The use of composite indicators as a measurement tool in alcohol and drug policy research has been increasing along with a broader trend to use them in other policy areas (Moxham-Hall & Ritter, 2017). Although policymakers have had indices allowing for state-specific comparisons for alcohol-impaired driving during a time when alcohol-impaired driving laws were rapidly strengthening (Fell & Voas, 2006; Mothers Against Drunk Driving, 2000, 2019), no state-specific measurements have been available to characterize the strength of policy environments for alcohol control more generally.

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State-level comparisons of the broader alcohol policy environments, as opposed to those geared toward preventing impaired driving, are relevant. Approximately 85% of all alcohol-related deaths due to excessive alcohol consumption are from causes other than alcohol-related motor vehicle crashes (Centers for Disease Control and Prevention, 2014). Furthermore, our previous research indicates that policies targeting excessive drinking have an independent protective effect on reducing the likelihood of impaired driving (Naimi et al., 2018; Xuan et al., 2015a). Prior research on the effect of individual policies has demonstrated that drinking-oriented policies can reduce alcohol-impaired driving and alcohol-related crash fatalities (Birckmayer et al., 2008; Grube & Stewart, 2004; Popova et al., 2009; Rammohan et al., 2011; Wagenaar et al., 2009, 2010; Whetten-Goldstein et al., 2000).

Our research team previously developed the Alcohol Policy Scale (APS) by consulting with experts who nominated and rated the efficacy of 29 alcohol control policies (Naimi et al., 2014). APS scores were validated based on their goodness-of-fit for associations with state-level variation in adult and youth binge drinking and youth drinking (Naimi et al., 2014; Xuan et al., 2015c). The APS may be used to compare states to one another, indicate potential room for improvement within each state, and show changes over time. The APS also allows for the separation of policies into groupings of similar policies (i.e., driving-oriented vs. drinking-oriented) for further assessment to identify changes over time among thematically related policy groups.

Using APS scores for each state, this article (a) characterizes the alcohol policy environment in each U.S. state as of 2018, (b) describes the changes in policy environments from 1999 to 2018, and (c) examines how mutually exclusive groups of policies (i.e., drinking-oriented vs. driving-oriented policies and youth vs. general-population policies) were associated with one another in 2018 and how they changed over 20 years. These findings can inform state agencies and legislatures when developing strategies to prevent a leading cause of behavior-related morbidity, mortality, and health-related economic costs in the United States.

Method

Policy data sources

The APS scores used in this report have been validated and analyzed in previous publications (Naimi et al., 2014; Nelson et al., 2015; Xuan et al., 2015c). The scores were updated for this article by adding years of policy data. The methodology used to develop the APS scores is described below.

Data on alcohol policies were extracted from data sources that used uniform ascertainment methods across all 50 states (Naimi et al., 2014). The primary source for 15 of the 29

policies was the Alcohol Policy Information System (National Institute on Alcohol Abuse and Alcoholism, 2018). Eighteen additional data sources were used to collect and code data about policies and provisions that were not included in the Alcohol Policy Information System database, such as sources from the Beverage Information Group (2018), Insurance Institute for Highway Safety (2018), and National Highway Traffic Safety Administration (2017) (Naimi et al., 2014). Multiple data sources were available for some policies and were cross-checked to ascertain consistency. Remaining discrepancies were resolved by a public health lawyer using the legal research databases WestlawNext (Thomson Reuters) and Lexis Advance (LexisNexis). For six policies with missing data before 2009, the research team used WestlawNext, in consultation with a public health lawyer, to conduct historical reviews and obtain complete policy data for those missing years.

Alcohol Policy Scale development

A panel of 10 experts in alcohol policy assisted with the selection of alcohol policies for inclusion in the APS (Appendix 1) (Nelson et al., 2013b). These experts were from academia, government, and the private sector and represented different areas of expertise, including law, epidemiology, psychology, sociology, economics, and community organizing. Forty-seven alcohol control policies were nominated by panelists. The scale ultimately included 29 policies for which consistently collected and reliable cross-state data were available. Since this was a study of state-level alcohol policies, policies that were not included were federal policies (e.g., restrictions on mass media advertising), policies that did not vary across states (e.g., public intoxication laws), and policies without reliable data across states (e.g., compliance checks of retail establishments).

Investigators developed standardized, idealized descriptions of each policy. Panelists then independently rated the efficacy of each policy based on a 5-point Likert scale (1 = *low efficacy*, 5 = *high efficacy*) for each of four distinct domains: reducing binge drinking among the general population, reducing impaired driving among the general population, reducing drinking among youth, and reducing impaired driving among youth (Nelson et al., 2013b). The mean of the panelists' ratings for each policy in a given domain was used as its efficacy rating (ER). The APS scale scores used in this study were based on efficacy ratings for reducing binge drinking among the general population because these ratings have the broadest applicability to the full spectrum of alcohol-related problems among the full population. Binge drinking was defined as drinking four or more drinks per episode for a woman and five or more drinks per episode for a man.

In consultation with panelists with expertise in particular policies, investigators also developed a legislative imple-

mentation rating (IR) for each policy based on provisions or characteristics of a particular policy (Naimi et al., 2014). Factors influencing the implementation rating were primarily related to the policy's statutory design, including provisions enabling the policy to be effective, broadly applicable, and enforceable. For example, ratings of keg registration laws were based on the size of the keg to which the law applied, the amount of deposit required, and whether there were penalties for label destruction. In some cases, the IR was determined by its magnitude (e.g., state alcohol tax rates, alcohol outlet density, number of alcohol control enforcement personnel). For all policies, the IR score for each policy by state and year ranged from 0.0 (*no policy*) to 1.0 (*full implementation*). IR scores varied by state and year, whereas the scoring criteria applied to each policy were uniform across state and year.

Aggregating policy data to generate APS scores

To construct APS scores, we multiplied each policy's ER by the same policy's IR of a given year. We then summed across 29 products to obtain an overall score for each state-year. Mathematically, the formula to calculate the raw APS scores is as follows:

$$APS\ score_{jh} = \sum_{k=1}^{n=29} (ER_k * IR_{kjh})$$

where j = state, h = year, k = policy, ER = efficacy rating, and IR = legislative implementation rating. Each raw APS score was then divided by the maximum possible score and multiplied by 100 to rescale it within a theoretical range from 0 to 100.

Generating APS subgroup scores

Modified APS scores for four policy subgroups (youth policies, adult policies, driving policies, and excessive consumption policies) were also calculated for each state (Appendix 2). Methods for calculating modified APS scores to represent policy subgroups were the same as described above, except that efficacy ratings differed according to the appropriate policy subgroup (e.g., impaired-driving efficacy ratings were used for the impaired-driving policy subgroup).

Adult policies (19 policies) were defined as policies that are not specific to targeting individuals under the legal drinking age (≤ 20 years of age). Youth-specific policies (10 policies) were mutually exclusive of adult policies and were defined as policies aimed at reducing or preventing access to alcohol specifically among individuals under the legal drinking age (≤ 20 years of age). Excessive consumption policies (21 policies) consisted of policies that regulate alcohol production, sales, consumption, or furnishing practices. Excessive consumption policies were mutually exclusive of impaired-driving policies (eight policies), which consisted of

policies to prevent an already impaired person from driving a motor vehicle.

Analysis

We conducted descriptive and comparative analyses of state APS scores cross-sectionally and throughout the study period. Individual state scores were also reported, as were state ranks for easy identification of the relative restrictiveness of state policy environments. Relationships between mutually exclusive policy subgroups within the scale were assessed using Pearson correlation coefficients.

Results

Restrictiveness of policy environments within U.S. states and changes over time

Table 1 presents state-specific APS scores based on all 29 policies. In 2018 (the most recent year), the median state score was 43.5 (out of a possible score from 0 to 100), and 43 states had scores less than 50. There was considerable variation between states, ranging from 67.9 (Utah, representing the most restrictive policy environment) to a low of 25.6 (South Dakota) (Figure 1). Northeast states tended to have stronger policy environments, as 5 of the 6 New England states (Connecticut, Massachusetts, Maine, New Hampshire, and Vermont) were among the 25 states with the highest APS scores. States with less restrictive policy environments tended to be in the Midwest (Iowa, Indiana, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin) and Intermountain West (Colorado, Idaho, Montana, Nevada, and Wyoming). The four most populous states (California, Florida, New York, and Texas) were among the 25 states having the lowest APS scores.

From 1999 to 2018, 24 states improved their ranking (most notably Arizona and the District of Columbia), 18 states experienced a decrease in rank (particularly Delaware, Georgia, and Virginia), and the other states retained their ranks (Table 1). Across all 50 states and Washington, DC, the median change in APS scores from 1999 to 2018 was +4.9 (range: -7.4 [Washington] to +10.3 [Nevada]), with scores increasing (indicating a more restrictive policy environment) from a median of 39.1 in 1999 to a median of 43.5 in 2018. APS scores decreased in only six states ($Mdn_{decrease} = -1.1$), ranging from -0.1 (Florida) to -7.4 (Washington).

The primary reason for Washington's decrease in the APS score was that it privatized the sale of wine and distilled spirits. Nevada began the study period with the lowest score but had the largest increase (+10.3), resulting from a variety of policy changes, including a tax increase in 2003, mandated server-seller training beginning in 2005, and several impaired-driving laws such as lowering the blood alcohol concentration driving limit from .10% to .08% in 2003.

TABLE 1. Alcohol Policy Scale (APS) scores, U.S. states and District of Columbia, 2018, and change in scores since 1999

State	2018 APS score	2018 APS score state rank ^a	APS change from 1999 (% change)	Rank for greatest score increase ^b
Median, all states	43.5	26	+4.9 (12%)	26
Alabama	57.4	3	+2.3 (4%)	36
Alaska	40.8	35	+7.9 (24%)	11
Arizona	46.5	16	+9.2 (25%)	4
Arkansas	43.5	26	+8.7 (25%)	6
California	33.2	47	+1.2 (4%)	44
Colorado	39.4	37	+5.8 (17%)	21
Connecticut	44.3	23	+2.8 (7%)	35
Delaware	43.5	27	+0.1 (0%)	45
District of Columbia	47.1	12	+8.2 (21%)	8
Florida	32.1	50	-0.1 (0%)	46
Georgia	40.9	34	-0.2 (-1%)	47
Hawaii	45.1	21	+4.3 (11%)	30
Idaho	41.4	31	-0.8 (-2%)	48
Illinois	45.8	18	+4.7 (11%)	28
Indiana	42.8	28	+7.9 (23%)	10
Iowa	33.1	48	+6.7 (25%)	17
Kansas	52.2	7	+2.0 (4%)	41
Kentucky	43.6	25	+6.1 (16%)	19
Louisiana	44.3	22	+8.0 (22%)	9
Maine	47.0	14	+2.0 (4%)	40
Maryland	37.6	40	+9.0 (31%)	5
Massachusetts	46.2	17	+3.7 (9%)	32
Michigan	46.8	15	+2.9 (6%)	33
Minnesota	42.7	29	+1.7 (4%)	42
Mississippi	41.7	30	+5.6 (15%)	22
Missouri	35.6	43	+8.3 (30%)	7
Montana	35.8	42	+7.8 (28%)	12
Nebraska	37.9	39	+7.3 (24%)	14
Nevada	33.5	46	+10.3 (45%)	1
New Hampshire	54.2	6	+6.8 (14%)	16
New Jersey	41.1	33	+5.2 (15%)	24
New Mexico	47.8	9	-1.6 (-3%)	50
New York	38.5	38	+7.3 (23%)	15
North Carolina	47.0	13	+5.2 (12%)	25
North Dakota	33.8	44	+1.2 (4%)	43
Ohio	45.6	19	+2.2 (5%)	37
Oklahoma	60.0	2	+2.0 (4%)	38
Oregon	47.2	10	+4.7 (11%)	29
Pennsylvania	56.6	4	+6.1 (12%)	20
Rhode Island	40.0	36	+3.9 (11%)	31
South Carolina	45.6	20	+6.1 (16%)	18
South Dakota	25.6	51	+2.0 (9%)	39
Tennessee	56.0	5	+2.8 (5%)	34
Texas	37.5	41	+9.8 (35%)	2
Utah	67.9	1	+9.7 (17%)	3
Vermont	50.2	8	+4.9 (11%)	26
Virginia	41.2	32	-1.3 (-3%)	49
Washington	47.1	11	-7.4 (-14%)	51
West Virginia	43.9	24	+4.8 (12%)	27
Wisconsin	33.7	45	+5.4 (19%)	23
Wyoming	32.6	49	+7.7 (31%)	13

^aRank of 1 indicates the most restrictive policy environment (highest APS score). ^bRank of 1 indicates the largest increase in the restrictiveness of the policy environment (largest increase in APS score) during the 20-year study period.

Utah had the highest APS score in every year of the study period and also the third largest increase from 1999 to 2018, with an APS score increase of 9.7, resulting in a score more than 10% above the second highest score, which was held by Oklahoma. As of 2018, South Dakota was the last ranked

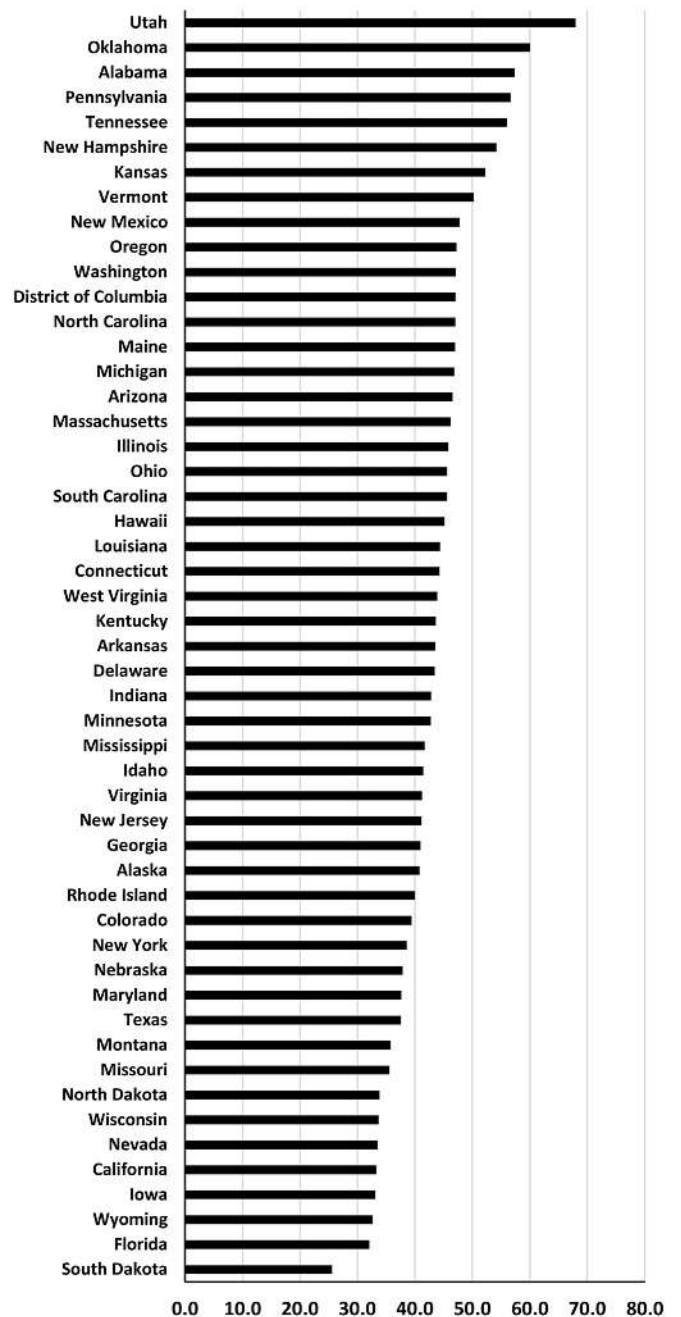


FIGURE 1. Rankings of states based on the restrictiveness of alcohol policy environment characterized by Alcohol Policy Scale scores. States are organized from most restrictive to least restrictive policy environment, with higher scores representing more restrictive policies.

state, with an APS score 6.5 points behind the second-to-last ranked state (Florida).

Table 2 shows that among the 26 states with the highest APS scores in 2018 and the 26 states with the most improvement in APS scores from 1999 to 2018, 11 states experienced both the highest scores and the most improvement. Utah and the District of Columbia were in the top quartile for both measures: (a) high APS scores in 2018 and

TABLE 2. Restrictiveness of U.S. state alcohol control policies in 2018, and change over time, 1999–2018

Variable	States with the most restrictive alcohol policies, ^a 2018		States with least restrictive alcohol policies, ^a 2018	
States with most improvement ^b from 1999 to 2018	Arizona	North Carolina	Alaska	Nebraska
	Arkansas	Pennsylvania	Colorado	Nevada
	District of Columbia	South Carolina	Indiana	New Jersey
	Kentucky	Utah	Iowa	New York
	Louisiana	Vermont	Maryland	Texas
	New Hampshire		Mississippi	Wisconsin
			Missouri	Wyoming
			Montana	
States with least improvement ^b from 1999 to 2018	Alabama	New Mexico	California	Minnesota
	Connecticut	Ohio	Delaware	North Dakota
	Hawaii	Oklahoma	Florida	Rhode Island
	Illinois	Oregon	Georgia	South Dakota
	Kansas	Tennessee	Idaho	Virginia
	Maine	Washington		
	Massachusetts	West Virginia		
	Michigan			

^aStates were split according to the 26 states with highest Alcohol Policy Scale (APS) scores, which all had scores above 43.5 (range: 43.55–67.9; *Mdn* = 47.0) and the 25 states with lowest APS scores, which all had scores below 43.5 (range: 25.6–43.46; *Mdn* = 37.9). Higher APS scores correspond to stronger or more restrictive policy environments.

^bStates were split according to the 26 most improved states all having improvement in APS scores greater than 4.8 (range: 4.9–10.3; *Mdn* = 7.5) and the 25 least improved states all having changes in APS scores equal to or less than 4.8 (range: -7.4–4.8; *Mdn* = 2.0). Higher APS scores correspond to stronger or more restrictive policy environments.

(b) large APS score increases from 1999 to 2018 (data not shown in table). Among the 25 states with the lowest scores and the 25 states with the least improvement, 10 states had both the lowest scores and the least improvement. California, Florida, North Dakota, and South Dakota were in the bottom quartile for both lowest scores and least improvement (data not shown in table).

Excessive drinking versus impaired-driving policy subgroups

We divided all policies into two mutually exclusive subgroups for excessive drinking-oriented ($n = 21$) versus impaired driving-oriented ($n = 8$) policies. Among policy subgroups, states had stronger impaired-driving scores (*Mdn* = 67.0) than excessive drinking scores (*Mdn* = 38.9). Excessive drinking subgroup scores ranged from a low of 19.8 (South Dakota) to a high of 65.8 (Utah), whereas impaired-driving subgroup scores ranged from a low of 39.1 (Montana) to a high of 86.4 (Kansas). All but three states (Idaho, Michigan, and Tennessee) had impaired-driving subgroup scores that were higher than excessive consumption subgroup scores. Twelve states had impaired-driving subgroup scores that were 40 or more points higher than excessive drinking subgroup scores, including Colorado, which had the largest difference between drinking and driving subgroup scores (52.6 points). There was no correlation between states' excessive drinking subgroup scores and their impaired-driving subgroup scores ($r = .05, p = .74$) (Figure 2, left-hand graph).

A substantial increase in scores from 1999 to 2018 occurred with the impaired-driving subgroup, with a state

median score of 41.1 in 1999 and a state median score of 67.0 in 2018 (Figure 3). The change in impaired-driving subgroup scores ranged from -1.4 (Idaho) to +60.8 (Arizona). Conversely, the excessive drinking subgroup (based on remaining policies) experienced essentially no change during the study period (*Mdn*_{score} = 38.4 in 1999 to 38.9 in 2018; range: -10.0 [Washington] to +8.1 [Nevada]).

Adult-oriented policies versus youth-oriented policies subgroups

APS scores were calculated for two additional mutually exclusive policy subgroups: adult-oriented policies ($n = 19$) versus youth-oriented policies ($n = 10$). Among these policy subgroups, states had youth scores (*Mdn* = 44.4) of similar strength as adult scores (*Mdn* = 44.6). Adult subgroup scores ranged from a low of 26.7 (Wyoming) to a high of 66.7 (Utah). Youth subgroup scores ranged from a low of 19.6 (Kentucky) to a high of 81.6 (Utah). Adult versus youth APS subgroup scores were moderately correlated ($r = .29, p = .04$) (Figure 2, right-hand graph). Among states with a larger youth subgroup score compared with adult subgroup score, Wyoming had the largest difference, with a youth subgroup score 36.0 points greater than its adult subgroup score. Among states with a larger adult subgroup score compared with youth subgroup score, Kentucky had the largest difference, with an adult subgroup score 28.8 points greater than its youth subgroup score.

During the study period, the state median score for youth-oriented policies increased from 38.5 in 1999 to 44.4 in 2018, as did the median score for adult-oriented policies, with an increase from 40.2 in 1999 to 44.6 in 2018 (Figure

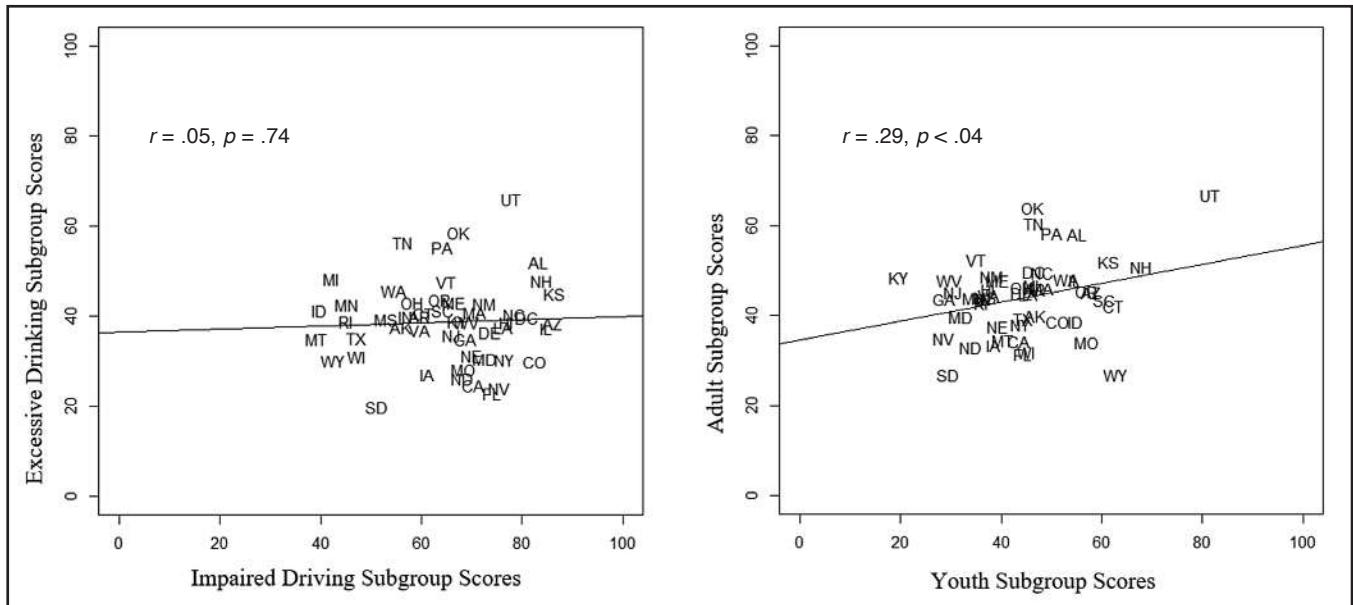


FIGURE 2. Relationship between policies targeting excessive consumption versus policies targeting impaired driving,^a and relationship between policies targeting adults versus policies targeting underage youth,^b U.S. states, 2018. ^aPolicies targeting excessive consumption consisted of 21 policies that regulate alcohol production, sales, consumption, or furnishing practices. Policies targeting impaired driving consisted of 8 policies aimed at preventing an already intoxicated person from driving a motor vehicle. ^bPolicies targeting adults consisted of 19 policies that are aimed at the general population and not specific to targeting individuals under the legal drinking age (<21 years of age), whereas policies targeting youth consisted of 10 policies aimed at reducing or preventing access to alcohol specifically among individuals under the legal drinking age (<21 years of age).

3). The change in youth policy subgroup scores ranged from -3.4 points (Indiana) to +30.0 points (Missouri), and for adult subgroup scores it ranged from -9.6 points (Washington) to +11.2 points (Texas).

Discussion

This is the first article to report state scores and ranks based on the restrictiveness of the alcohol policy environment (i.e., based on multiple policies) across all 50 U.S. states and Washington, DC. There was considerable between-state variation of state-specific alcohol policy environments as of 2018, as well as variation in changes of these policy environments from 1999 to 2018. However, as of 2018, no state had an APS score that exceeded 68% of the maximum possible score, and 43 states had APS scores less than 50% of the maximum, indicating substantial room for enhancement of alcohol policies in all states.

Most of the increase in state alcohol policy restrictiveness was attributable to the adoption of impaired-driving laws, whereas policies geared toward excessive alcohol consumption remained virtually unchanged. This, together with the higher subscale scores for impaired-driving policies versus subscale scores for excessive drinking policies, suggests that impaired driving is viewed as a problem distinct from excessive drinking and that impaired-driving policies have been the focus of state policymakers over the past two decades. This is problematic, because approximately 85%

of all alcohol-related deaths in the United States are from causes other than alcohol-related motor vehicle crashes (Centers for Disease Control and Prevention, 2014) and because our previous research indicates that policies targeting excessive drinking have an independent protective effect on reducing the likelihood of impaired driving and the odds of dying in an alcohol-related motor vehicle crash (Naimi et al., 2018; Xuan et al., 2015a). As such, the failure to strengthen policies to reduce excessive drinking represents an important missed opportunity for prevention of alcohol-related problems.

Indices can be used as a starting point to initiate a conversation about policy, as a piece of the puzzle for determining whether advancing policy is desirable, for evaluating policy, and as a tool to advocate for or against changes in laws. The use of indices as a measurement tool in alcohol and drug policy research has largely been to evaluate policy restrictiveness in relation to health outcomes (Moxham-Hall & Ritter, 2017), but they have been used more broadly in other fields such as the environment, economy, research, technology, and health care (Nardo & Saisana, 2008; Saisana & Tarantola, 2002). For research, indices can operationalize otherwise complex entities (various mixes of multiple alcohol policies). Similarly, simplifying and summarizing policies in a single metric facilitates awareness of policies and their adequacy and can galvanize policy action to reduce alcohol-related harms (Nardo & Saisana, 2008). Policy indices, including the APS, may be used as a starting point for a

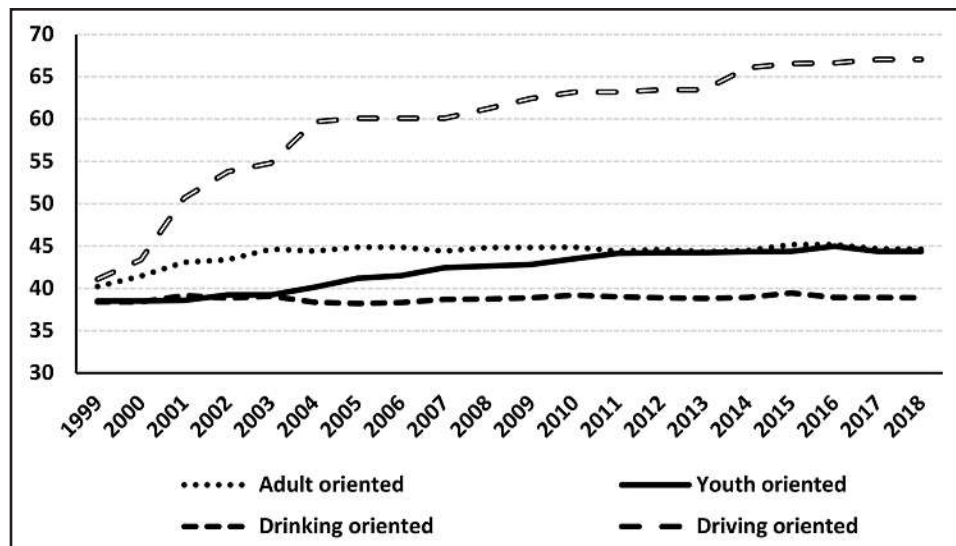


FIGURE 3. Change in median scores for state alcohol policy subgroups, 1999–2018. Lines consist of two sets of mutually exclusive policy subgroups. The first set of mutually exclusive subgroups of policies consisted of adult policies as a subgroup and youth policies as a subgroup. Adult policies consisted of the 19 policies that were not specific to individuals under the legal drinking age, whereas youth policies consisted of 10 policies aimed at reducing or preventing access to alcohol specifically among individuals under the legal drinking age. The second set of mutually exclusive subgroups of policies consisted of excessive drinking policies as a subgroup and impaired driving policies as a subgroup. Excessive drinking policies consisted of 21 policies that regulate alcohol production, sales, consumption, or furnishing practices. Impaired driving policies consisted of 8 policies aimed at preventing an already intoxicated person from driving a motor vehicle.

more detailed assessment of policy needs, assuming a corresponding inventory of individual policies is also available. Although this study is of primary interest to a U.S. audience, understanding policy variability more generally is important conceptually and can be used to identify policy trends that may or may not be prevalent in other nations (e.g., the adoption of impaired driving policies).

There is substantial room for enhancement of alcohol policies in all states. We decline to recommend an ideal APS score because the needs of states and competing factors (e.g., public support) will vary between states. However, a 10% increase in APS scores is reasonable for every state and desirable from a public health perspective. A 10% increase in APS scores (policy restrictiveness) is associated with a 7%–10% lower prevalence of adult binge drinking, youth drinking, and youth binge drinking; reduced alcoholic cirrhosis mortality; and reduced odds of alcohol-involvement in motor vehicle crash fatalities and alcohol-involved homicides (Hadland et al., 2015, 2017; Naimi et al., 2017, 2018; Xuan et al., 2015a, 2015b, 2015c). Furthermore, the highest score was 68 out of 100, the average score was slightly less than 50, and a 10% change in APS scores is approximately the interquartile range of APS scores among states. A 10% increase is an achievable target that could have a substantial health impact.

Utah had the highest score, at 68 out of 100, which leaves substantial room for strengthening alcohol control in Utah,

especially in the area of price-related policies. For example, despite a recent beer tax increase, Utah's beer tax is 4 cents for every 12 oz. of beer, which is close to the national average. Utah would have to triple its beer tax before reaching the highest beer tax in the United States, held by Tennessee at 12 cents for 12 oz. of beer. Utah could implement various wholesale pricing restrictions for beer, such as prohibiting volume discounts or requiring wholesalers to post and hold their prices for a specified period of time (i.e., 30 days). Utah can increase the price of its liquor sold in state-owned liquor stores. The average price of a 750 ml bottle among the top five most popular spirits brands in 2018 was \$18.51, which was lower than 3 of the 10 other states that sell distilled spirits at retail, including Virginia, where the average price was \$19.51. Utah can improve enforcement of impaired driving laws by removing the requirement that police departments obtain approval from a magistrate judge before conducting a sobriety checkpoint. Only one other state has such a requirement, and removing it would permit police departments to more freely conduct sobriety checkpoints. As of 2018, Utah had 15 state officers assigned to alcohol enforcement and control, which is about 1 officer for every 130 commercial alcohol establishments. By increasing the number of enforcement officers by 10, Utah would have about 1 officer for every 80 establishments and could increase proactive enforcement of and compliance with commercial alcohol laws.

This study is subject to caveats and limitations. The policies' efficacy and implementation ratings were informed by available scientific evidence and the opinions of a selected panel of experts. However, an alternate group may have come to different conclusions regarding the relative efficacy and implementation ratings of certain alcohol policies. Furthermore, because we did not include policies that did not exist in the United States, such as minimum pricing per unit of alcohol, states have more room for public health improvement than is demonstrated by our scale. In addition, we excluded policies that were federally implemented (e.g., alcohol marketing in the mass media) and policies that vary on a local level (e.g., county-wide alcohol taxes). Enforcement is a theoretically important component of policy implementation for some policies (Ritter, 2007), but there are no reliable, publicly available cross-state data about enforcement, even for specific policies. We addressed this by creating a specific policy around the number of alcoholic beverage control officers in each state and by including policy provisions that make certain policies more enforceable. Some policies may have differing effects by demographics, so rather than drawing simplistic conclusions from these scale scores (which combine disparate policies), these scores should be used as a starting point for initiating discussion and attracting public interest (Nardo & Saisana, 2008). A complete assessment of a state's alcohol policy environment would include an inventory of the state's alcohol policies and the prevalence of drinking patterns by demographics within the state.

Despite these limitations, this study is useful for comparing states with respect to their overall alcohol policy environments and assessing change within states over time. This information can assist policymakers and public health practitioners interested in reducing alcohol-related harms, including but not limited to those caused by alcohol-impaired driving. Policies that have the greatest impact on the public's health are vastly underused—particularly those policies aimed at restricting excessive alcohol consumption among the general population (Nelson et al., 2015). These findings are also relevant to policy debates about the best way to prevent excessive alcohol consumption, and about the importance of policy-oriented strategies to reduce overall alcohol-related harm.

Even with state-level variability, all states have room for substantial increases in the restrictiveness of their alcohol policies, particularly for those targeting excessive drinking. Despite good evidence and recommendations on the effectiveness of specific policies (e.g., taxation, dram shop liability, maintaining limits on hours of sale, and prohibiting service to intoxicated patrons) (Community Preventive Services Task Force, 2015; Rammohan et al., 2011), there has been resistance to adopt them consistently across the United States, and state alcohol excise taxes have declined substantially over time (Naimi et al., 2018).

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