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Authors

Matthay, Ellicott C

Mousli, Leyla

Apollonio, Dorie E

et al.

Publication Date

2023-09-01

DOI

10.1016/j.drugpo.2023.104114

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Research Paper

Alignment in local approaches to alcohol and cannabis control policy: A case study of California cities and counties [☆]



Ellicott C. Matthay ^{a,*}, Leyla Mousli ^b, Dorie E. Apollonio ^c, Laura A. Schmidt ^{b,d}

^a Center for Opioid Epidemiology and Policy, Division of Epidemiology, Department of Population Health, New York University Grossman School of Medicine, 180 Madison Ave, New York, NY 10016, USA

^b Philip R. Lee Institute for Health Policy Studies, School of Medicine, University of California, San Francisco, 490 Illinois St, 7th Floor, San Francisco, CA 94158, USA

^c School of Pharmacy, University of California, San Francisco, 530 Parnassus Ave, San Francisco, CA 94143, USA

^d Department of Humanities and Social Sciences, School of Medicine, University of California, San Francisco, 490 Illinois St, 7th Floor, San Francisco, CA 94143, USA

ARTICLE INFO

Keywords:

Cannabis
Alcohol
Policy
Local government
Public health
Political learning

ABSTRACT

Background: Public health experts have urged governments around the world to regulate newly legalized cannabis as they do alcohol to effectively and efficiently protect health. However, research evaluating the alignment of alcohol and cannabis policies is sparse. We assessed similarities and differences in local alcohol and cannabis control policies across California, and characterized localities adopting distinct policy approaches.

Methods: Using standard legal epidemiologic techniques, we collected and coded local alcohol and cannabis control policies relevant to public health for 12 California counties and all incorporated cities within them (N=241). We assessed whether localities were equally stringent on alcohol and cannabis policies by comparing overall restrictiveness (summed policy scores) and 9 specific provisions that applied to both substances. We captured distinct local alcohol-cannabis policy approaches using latent class analysis, and examined this classification in relation to local demographic, socioeconomic, political, and retail market characteristics.

Results: All 241 localities permitted alcohol sales, while 71% banned cannabis sales. Among those that did not ban cannabis sales, more stringent alcohol policy scores were associated with more stringent cannabis policy scores (linear regression coefficient: 0.16 [95% CI: 0.07, 0.25]). Local governments rarely adopted the same provisions for alcohol and cannabis (e.g., limits on hours of sale, advertising restrictions), and only two regulated the co-location of cannabis and alcohol outlets. Localities that were restrictive on alcohol yet permissive on cannabis (12%) were more urban, politically progressive, and had more low-income and racial/ethnic minority residents. Localities that were more permissive on alcohol and restrictive on cannabis (51%) were more socioeconomically advantaged.

Conclusion: We found few similarities between local alcohol and cannabis control policies. California's experience suggests that, as governments around the world legalize cannabis, lessons learned from regulating alcohol are not routinely applied to cannabis, particularly in communities distinguished by high social and economic advantages.

Introduction

As laws legalizing the recreational use of cannabis diffuse around the globe, governments face the need to coordinate cannabis control policies with existing regulations on alcohol. Policy coordination is important because the availability of cannabis can influence the consumption of alcohol as a substitute or complement (Guttmanova et al., 2016; Subbaraman, 2016). Cannabis is frequently co-used with alcohol (Yurasek et al., 2017), and when people co-use, it doubles the odds of im-

paired driving, social consequences (e.g., poor work performance), and harms to self compared to alcohol use alone (Subbaraman & Kerr, 2015).

Canada, Uruguay, and Portugal have recognized a need to coordinate recreational cannabis legalization policies with those regulating alcohol and tobacco (Hughes, 2018; Kirst et al., 2016). Similarly, the US has entertained a federal initiative called the "Regulate Marijuana Like Alcohol Act" (Kees et al., 2020). Although cannabis use remains illegal at the federal level, a growing number of US states have legalized recreational cannabis and now permit large commercial markets selling

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* Corresponding author at: Center for Opioid Epidemiology and Policy, Division of Epidemiology, Department of Population Health, New York University Grossman School of Medicine, 180 Madison Ave, New York, NY 10016, USA.

E-mail address: ellicott.matthay@nyulangone.org (E.C. Matthay).

diverse types of cannabis products to anyone aged 21 years or older. Some US state governments have passed identical policies on alcohol and cannabis, for example those addressing minimum ages of legal access and advertising restrictions (Klieger et al., 2017).

There are viable arguments for and against modeling cannabis policies after alcohol. Those against coordination argue that existing approaches to regulating alcohol have flaws that should not be carried over to cannabis. For example, whereas successful approaches to tobacco control typically involve robust demand reduction policies, some publicly-funded education campaigns painted alcohol as an appealing “forbidden fruit”, thereby unintentionally increasing demand (Barry & Glantz, 2018). Prior alcohol policies have relied on “responsible use” by adults, absolving governments of the responsibility to protect public health and failing to convey the health risks associated with even low levels of consumption (Barry & Glantz, 2018). Past approaches to alcohol control policymaking have also involved partnerships with the alcohol industry which created regulatory conflicts of interest and resulted in policies that prioritized business interests over public health (Barry & Glantz, 2016, 2018; Orenstein and Glantz). Thus, distinct, yet stronger, recreational cannabis controls may be desirable. There are also differences in the psychoactive properties of alcohol and cannabis that may warrant different policies. For instance, driving under the influence of alcohol appears to be riskier than driving under the influence of cannabis (Kilmer, 2019; Yurasek et al., 2017). The alcohol control template may also lead policymakers to overlook the many moderate alternatives between the extremes of complete prohibition and an alcohol-like commercial model, such as allowing adults to grow their own cannabis or government monopolies (Kilmer, 2019; Orenstein & Glantz, 2020).

Those favorable to modeling cannabis policies after alcohol argue that cannabis is being commercialized in ways that are similar to other legal substances, and a number of public health experts have urged US states to model recreational cannabis policies on existing policies for alcohol or tobacco (Barry & Glantz, 2016, 2018; Berg et al., 2018; Kilmer, 2019; Mosher, 2016; Orenstein & Glantz, 2020; Stockwell et al., 2020). Alcohol and cannabis share similar risks: both are intoxicating, addictive, and particularly harmful to youth (Mosher, 2016; Pacula et al., 2014). Decades of research documents that greater access to retailers, exposure to marketing, and lower prices increase alcohol use by youth and young adults (Berg et al., 2018; Kilmer, 2019; Pacula et al., 2014; Stockwell et al., 2020). Specific alcohol control policies can prevent underage use, addiction, and related harms (e.g., limiting the legal age of purchase, restricting retail outlet density, establishing high tax rates, and restricting advertising in youth-targeted programming) (Kilmer, 2019; Mosher, 2016; Stockwell et al., 2020). These policies have obvious analogues in cannabis control.

Policy regimes that are coordinated across substances may be more effective in achieving their goals, whereas inconsistencies in alcohol and cannabis control policies can lead to gaps in public health protection (Hughes, 2018; Kilmer, 2019). Policy coordination across substances can also ease implementation through a common enforcement and compliance infrastructure. Thus, some U.S. states have made alcohol control agencies responsible for cannabis control (Alcohol Policy Information System, 2022). Further, because different social groups may preferentially use alcohol or cannabis, policy coordination can promote fairness and avoid stigmatization (Helmer, 1975). Finally, policy coordination promotes political learning (Hecl, 2009; Schmidt et al., 2012). Lessons learned from decades of passing and implementing alcohol control policies can inform cannabis controls, while reducing uncertainty both for policymakers and the general public (Weick, 1995).

Even when policy coordination is intended, in federated countries local governments (e.g., cities, counties, townships) may frustrate efforts to coordinate cannabis and alcohol control policies if given discretion by higher levels of government (Pressman & Wildavsky, 1984). In the US, for example, local governments are granted considerable discretion by states to regulate where retail cannabis outlets can be located,

their hours of operation, product potency, packaging, marketing, and tax rates, resulting in extreme local-level heterogeneity in approaches to cannabis control (Dilley et al., 2017; Matthay et al., 2022a; Payán et al., 2021; Silver et al., 2020). On the one hand, this local discretion can be used to regulate the co-location of alcohol and cannabis outlets in low-income neighborhoods already overburdened by alcohol outlets, thus promoting public health and equity. On the other hand, constituents may pressure their local policymakers to keep both types of outlets out of wealthier neighborhoods—the so-called “not in my backyard” or NIMBY phenomenon—resulting in the opposite (Matthay et al., 2022a). The concern that local governments may compromise the coordination of alcohol and cannabis policies applies not only to the US but also to the 25 other countries with federalist systems, representing 40% of the world’s population (Forum of Federal Countries, 2022).

This study seeks to fill a gap in empirical policy research which is largely limited to mapping local variation in alcohol and cannabis policies separately, as if they occurred in isolation (Dilley et al., 2017; Matthay et al., 2022a; Payán et al., 2021; Silver et al., 2020; Thomas et al., 2012). To our knowledge, no research has compared and contrasted the approaches local governments take to alcohol and cannabis control, yet such assessments are essential to guide governments in understanding the public health implications of legalizing recreational cannabis. To fill this gap, we conducted two analyses: First, we empirically evaluated similarities and differences in the approaches local governments have taken to alcohol and cannabis control by collecting, coding, and analyzing policy data for 241 cities and counties in California. Second, to inform hypotheses for future work concerning why local governments adopt similar or different approaches, we examined policy variation in relation to population data on the demographic, socioeconomic, political, and retail market characteristics of cities and counties.

California legalized recreational cannabis in 2016 and is home to the largest legal cannabis market worldwide. The state has a long tradition of granting alcohol control authority to local governments and has taken a similar approach to cannabis control. This study focused on policies regulating recreational (not medical) cannabis, because recreational legalization effectively dissolved the medical cannabis system, and because parallels with alcohol control are most relevant to recreational cannabis. Based on political learning theory, recommendations from public health experts, and prior US state and federal initiatives to model cannabis control policies after alcohol, we hypothesized that local cannabis control policies would be similar to local alcohol control policies both in their overall stringency and specific provisions (Hecl, 1974; Lindblom, 1959; Mallinson & Hannah, 2020; Marsh & Sharman, 2009; Soss, 1999).

Methods

Alcohol and cannabis policy data collection

We collected and coded detailed data on local alcohol and cannabis control policies for 12 of California’s 58 counties and all incorporated cities within them, collectively covering 59% of the California population (25 million people). Counties were manually selected to capture a range of local drug policies, population sizes, sociodemographic compositions, and political orientations, and to be consistent with an existing study of local substance use policies (Matthay et al., 2022a). City policies apply within incorporated city borders, and county policies apply to county areas outside of incorporated cities. Because San Francisco is a consolidated city-county, the final study covered 241 unique jurisdictions (localities).

The cannabis policy data collection is described elsewhere (Matthay et al., 2022a), and the alcohol policy data collection process was identical (Thomas et al., 2012). Complete protocols and data collection instruments are provided in Appendices 1-4. Briefly, using a legal epidemiological approach (Dilley et al., 2017; Thomas et al., 2012;

Tremper et al., 2010), we systematically identified relevant legal text. We used structured data collection instruments to code the presence or absence and content of pre-specified policy provisions. All localities were coded separately by two analysts until achieving >95% agreement. Policy data collection and coding were conducted from July 2020 to January 2021. Measured policies correspond to those applicable at the time of data collection.

California state law specifies which alcohol and cannabis policies apply statewide and which policy areas can be controlled by city and county governments. These differed for alcohol and cannabis. For cannabis, the state dictates the minimum age of legal use, establishes impaired driving prohibitions, manages licensing of cannabis businesses at all stages of the production chain, and sets minimum standards for product safety, packaging, and labeling. Local governments retain considerable discretion to dictate the number, type, and location of commercial cannabis businesses, hours and days of sale, types of products that may be sold, additional requirements for packaging and labeling, tax rates, and clear air laws. For alcohol, the state controls most aspects of production, retail licensing, pricing and taxation, impaired driving, and underage prohibitions. However, local governments have the authority to regulate land use to protect health and welfare and thereby regulate the locations, density, and operations of retail outlets (e.g., requiring night lighting to help prevent crime and ensure public safety around outlets). Localities can also require responsible beverage service training, hold individuals civilly or criminally liable for hosting underage drinking on their property, limit advertising, and place restrictions on alcohol availability at special events such as concerts.

Within the bounds of state law, the local policy measures we collected were guided by an established comprehensive schema of local alcohol policies in California (Thomas et al., 2012), and a taxonomy of all possible cannabis policies (Klitzner et al., 2017). We focused on alcohol and cannabis control policies that regulate availability (e.g., retail outlet density limits) because these policies are a primary modifier of population-level consumption and associated health outcomes (Gruenewald, 2011a; Kilmer, 2019; Silver et al., 2020). For each substance, we coded all major categories of policies that: (a) could be regulated at the local level according to state law, (b) varied across California localities, (c) were more restrictive than state law (otherwise state law applies), and (d) were plausibly related to public health given prior evidence, public health best practices, and research involving interviews with experts (Dilley et al., 2017; Klitzner et al., 2017; Silver et al., 2020; Thomas et al., 2012). Because the policy areas with local discretion differed for alcohol and cannabis, there were 37 policies fulfilling these criteria for alcohol and 20 policies fulfilling these criteria for cannabis.

Alcohol and cannabis control policy measures

We developed two measures of alcohol and cannabis control policies: 1) an overall score capturing stringency and comprehensiveness of the local policy regime (hereafter, “stringency score”), and 2) specific policy provisions that could be applied to both alcohol and cannabis.

For alcohol, the overall stringency score was computed as the weighted sum of all 37 binary policies we collected, which covered: zoning and land use restrictions on the density, locations, and operations of outlets (conditional use permits, deemed approved ordinances); responsible server training requirements; prohibitions on hosting underage drinking; limitations on advertising; restrictions on alcohol availability at special events; and public drinking prohibitions. The weighting scheme was developed by Thomas and colleagues (2012) based on a systematic review of evidence on the strength of each policy in reducing alcohol-related harms, with weaker policies assigned a weight of 1 and stronger policies assigned a weight of 2. For the one policy with the negative weight, we inverted it so the absence of the policy received a weight of 1.

For cannabis, the overall stringency score was based on all 20 policies we collected, which covered: restrictions on the density, locations,

and operations of outlets; on-site consumption bans; responsible server training requirements; prohibitions on hosting underage consumption; limitations on advertising; restrictions on cannabis availability at special events; limits on product types, potency, packaging, and labelling; price controls; retail taxes; and personal cultivation practices (see Appendices 3-4 for details). Absent evidence to guide a weighting scheme, the stringency score was calculated as an unweighted sum of the 20 binary policies; this approach assumes that all cannabis policies are equally important. Cannabis policy stringency scores were computed for the subset of localities that do not ban retail cannabis sales because most cannabis controls were not relevant in localities without retail sales. To compare the prevalence of individual provisions, we identified all those policies that could be applied both to alcohol and cannabis. Of the 37 alcohol policies and 20 cannabis policies we collected, only 9 policies overlapped, because the policy areas with local discretion differed for alcohol and cannabis. These 9 provisions were: limits on hours of sale; limits on advertising; responsible server training requirements; prohibitions on outlet overconcentration; minimum distances between outlets and sensitive locations (e.g., schools); prohibitions on hosting underage consumption (i.e., social host laws); restrictions on special outdoor events; local permitting for retail sales (i.e., in addition to state licensing); and outlet safety requirements such as night lighting. While these local provisions can generally be applied to both alcohol and cannabis, there were some small discrepancies due to differences in the state regulatory frameworks for alcohol and cannabis. These are detailed in Appendix 5.

City and county characteristics

To characterize the populations subject to varying alcohol-cannabis control approaches, we merged the policy data to data on a range of demographic, socioeconomic, political, and retail market characteristics. Measures included demographic and socioeconomic indicators from the American Community Survey; voting history in cannabis-related and presidential elections; and densities of all retail, service industry, alcohol, and cannabis outlets from license listings and Zip Code Business Patterns (Matthey et al., 2022a; Matthey et al., 2022b). A complete enumeration of the data sources is provided in Appendix 5 Table 1.

Statistical analysis

We conducted two sets of analyses focused on: 1) similarities and differences in local governments’ approaches to alcohol and cannabis control, and 2) how different combinations of alcohol-cannabis control policies (e.g., restrictive on cannabis but not alcohol, restrictive on both substances) mapped on to the demographic, political, and retail market characteristics of localities.

To assess similarities and differences in local governments’ approaches to alcohol and cannabis control, we scaled the alcohol and cannabis policy stringency scores to range between 0 and 100 and then compared them using unpaired t-tests and linear regression. Then we compared each of the 9 specific provisions using Cohen’s Kappa (Cohen, 1960).

To evaluate how different combinations of alcohol-cannabis control policies mapped on to the characteristics of localities, we first categorized local governments’ overall approaches to alcohol-cannabis regulation using latent class analysis (LCA). Briefly, LCA uses a set of observed variables (in this case, the policies) to identify subgroups (“latent classes”; in this case, groups of localities) with similar characteristics. LCA has been widely used in the alcohol and drug policy literature to classify regulatory approaches (Erickson et al., 2015, 2016; Smith et al., 2019). Because of our small sample size of 241 localities, we could not use all 57 measured alcohol and cannabis policies in the LCA. Instead, we prioritized including policies with the most variability across localities and tested the sensitivity of the results to varying the choice of included policies. Following recommended practice, we

Table 1
Agreement between specific local alcohol and cannabis policies, California, 2020.

| Policy | Localities with policy for alcohol (n) | Localities with policy for cannabis (n) | Localities adopting the policy for both substances (%) | Localities without the policy for both substances (%) | Agreement between alcohol and cannabis approaches (either both adopted or neither adopted) (%) | Cohen's K (95% CI) |
|--|--|---|--|---|--|------------------------|
| Substance-specific local permit required (Conditional Use Permit or Deemed Approved Ordinance for alcohol) | 30 | 68 | 43% | 1% | 45% | 0.02 (-0.02, 0.07) |
| Minimum distances between outlets and sensitive locations (e.g., schools) | 17 | 59 | 22% | 12% | 33% | 0.02 (-0.08, 0.12) |
| Night lighting or other safety requirements for outlets | 9 | 65 | 12% | 4% | 16% | -0.02 (-0.08, 0.04) |
| Limits on advertising | 12 | 30 | 10% | 49% | 59% | 0.11 (-0.08, 0.31) |
| Prohibitions on hosting underage consumption (social host) | 32 | 5 | 7% | 54% | 61% | 0.17* (0.03, 0.30) |
| Prohibitions on outlets in areas of overconcentration, high crime, etc. | 15 | 8 | 3% | 70% | 72% | 0.03 (-0.20, 0.26) |
| Restrictions on special outdoor events | 15 | 16 | 3% | 58% | 61% | -0.12 (-0.32, 0.08) |
| Responsible server training requirements | 10 | 4 | 1% | 81% | 83% | 0.07 (-0.19, 0.32) |
| Limits on hours of sale | 2 | 53 | 1% | 22% | 23% | -0.02 (-0.08, 0.04) |

tested models ranging from 1 to 5 classes and selected the best-fit models by jointly considering substantive interpretability, Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC) (Steinley & Brusco, 2011). We conducted separate LCA models for alcohol and cannabis policy variables, because models incorporating alcohol and cannabis policy variables simultaneously were dominated by the distinction between localities permitting versus banning retail cannabis businesses and failed to retain further nuance. Additional detail on the LCA is provided in Appendix 5.

In a final step, we then examined variation in demographic, socioeconomic, political, and retail market characteristics of the cities and counties falling into each alcohol-cannabis LCA policy class. Three localities had local governments but no people permanently residing within their boundaries; these localities were excluded from the analyses describing demographic, socioeconomic, political, and retail market characteristics by alcohol-cannabis regulatory approach. All analyses were conducted using R version 4.0.4. Analyses were not pre-registered.

Results

Similarities and differences in local approaches to alcohol and cannabis control

Across the 241 cities and counties, the average alcohol control policy stringency score was 7.7 (range: 0-26; maximum possible score [most stringent]: 46). Fully 172 local governments (71%) banned retail businesses selling medical and recreational cannabis whereas 69 (29%) allowed at least one type of retail cannabis business. Even though receipt of home delivery of cannabis is legal statewide, cities and counties could still ban retail cannabis businesses from opening up within their borders. In the 29% of localities that allowed retail cannabis businesses to open, the average cannabis control policy stringency score was 9.0 (range: 4-15; maximum possible score [most stringent]: 20).

Local governments that banned retail cannabis businesses had less stringent alcohol regulations overall (mean difference in scaled stringency score: 4.4 [95% CI: 0.6, 8.1]), implying an inverse relation between policies regulating alcohol versus cannabis. Among the subset of local governments that did not completely ban retail cannabis businesses (n=69), however, alcohol and cannabis control policy stringency scores were modestly positively associated. For every one-unit

increase in the scaled alcohol policy stringency score (range 0-100) we observed an average 0.37-unit increase in the scaled cannabis policy stringency score (95% CI of linear regression coefficient: 0.16, 0.58; Appendix 5 Fig. 2).

Among the specific provisions that applied to both alcohol and cannabis, it was infrequent that local governments adopted the same policy for both (Fig. 1; Table 1). The provisions local governments most frequently adopted for both substances were requirements for local business permits (43% of localities) and minimum distances between retail outlets and sensitive locations such as schools (22% of localities). Local governments were most likely to approach alcohol and cannabis control differently when it came to the application of safety requirements such as night lighting (84% of localities were discordant) and limits on hours of sale (77% of localities were discordant). After accounting for chance, only prohibitions on underage consumption (social host laws) showed significant agreement (Cohen's K: 0.17 [95% CI: 0.03, 0.30]).

Local governments in California also had the authority to regulate the co-location of cannabis and alcohol outlets by restricting how nearby cannabis outlets could be located in relation to alcohol outlets. Only two of 241 local governments took advantage of this authority by mandating a minimum distance between alcohol and cannabis outlets.

Categorization of overall approaches to alcohol-cannabis control across California cities and counties

The final LCA included 18 alcohol and cannabis policies. The model successfully classified localities based on their overall approaches to alcohol-cannabis control. For cannabis, localities were best categorized into two classes: those that banned all retail cannabis businesses (hereafter, "strict") versus those that allowed at least one type of retail (hereafter, "lenient"). For alcohol, the metrics used to select the best-fit model indicated that models with 2 or 3 classes fit the data better than models with 1, 4, or 5 classes, but did not clearly distinguish between models with 2 versus 3 classes. We therefore considered both the 2- and 3-class categorizations, which we named: "strict versus lenient" (2-class solution), or "universally strict", "lenient but with social host laws", and "intermediate restrictiveness without social host laws" (3-class solution). For interpretability, we present the two-class categorization of alcohol control in the main text and results for the three-class categorization in Appendix 5.

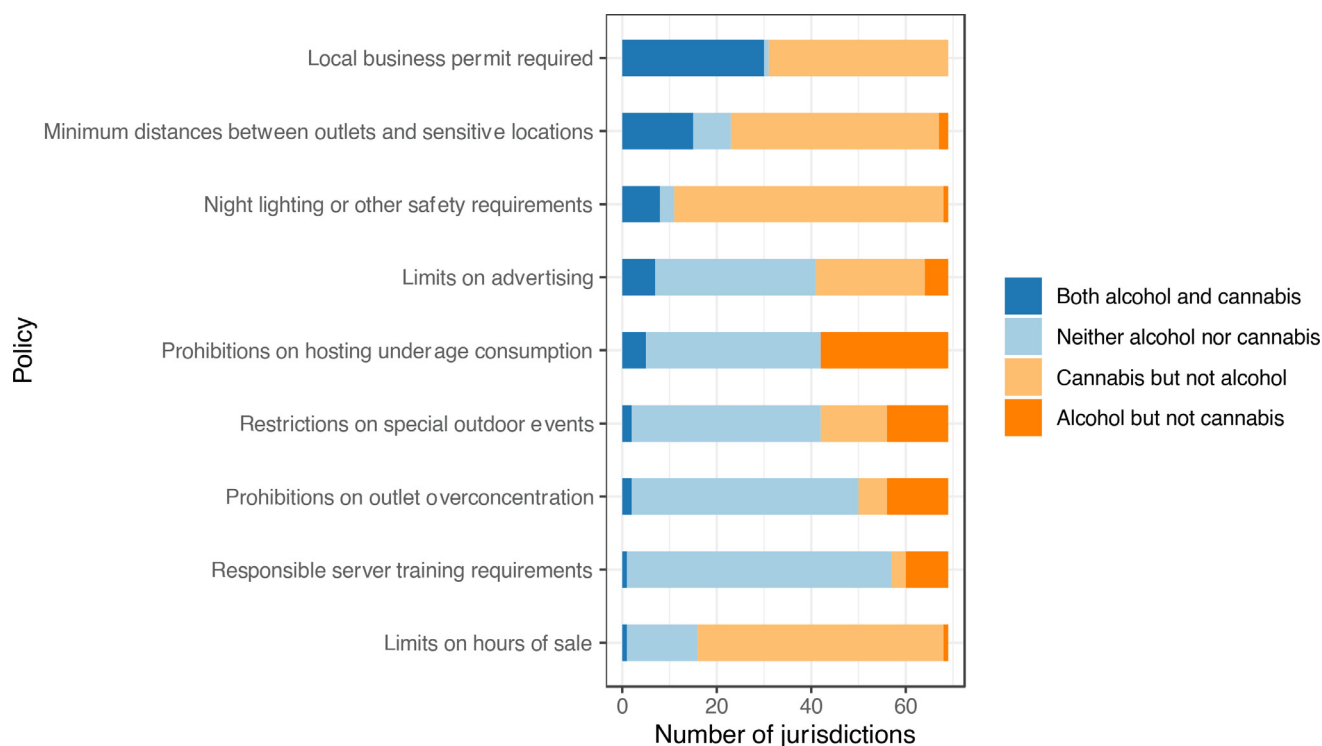


Fig. 1. Frequency of local governments' adoption of the same provisions for regulating alcohol and cannabis, California, 2020.

We cross-classified the two categorizations of alcohol and cannabis control approaches, finding that 50 of the 241 local governments (21%) were strict on both alcohol and cannabis control, 29 local governments (12%) were strict on alcohol and lenient on cannabis, 122 local governments (51%) were strict on cannabis and lenient on alcohol, and 40 local governments (17%) were lenient on both substances. Overall approaches to alcohol-cannabis control were highly variable within and across counties (Fig. 2).

Characteristics of California cities and counties with varying overall approaches to alcohol-cannabis control

Table 2 summarizes characteristics of the populations subject to the four alcohol-cannabis control approaches: strict on both alcohol and cannabis, lenient on both, strict/lenient, and lenient/strict. Overall, localities that were lenient on both alcohol and cannabis were the least population dense, least educated, with predominantly White residents, and contained the most alcohol and cannabis outlets per capita relative to localities with other alcohol-cannabis control approaches. In contrast, localities that were strict on both alcohol and cannabis tended to be urban, with intermediate levels of education and income, and high proportions of Asian residents.

Localities that were strict on alcohol but lenient on cannabis had the highest population density, with the highest levels of poverty, unemployment, the most liberal voters, the most Black and Hispanic residents, and the fewest White residents. Localities that were lenient on alcohol and strict on cannabis had intermediate population density, with the highest levels of education, least poverty and unemployment, most conservative voters, most Asian and White residents, and fewest Black and Hispanic residents.

Discussion

Public health experts have urged governments around the world to regulate recreational cannabis as they do alcohol, and some governments have tried to do so. Although cannabis and alcohol are different

substances with different risks, there are inherent advantages in applying lessons learned from alcohol policymaking to cannabis. This is the first effort to empirically examine if and how local recreational cannabis policies mirror existing alcohol policies. In this case study of 241 California cities and counties, we found little evidence that local governments were following a coordinated approach. The local governments studied here had been granted power to coordinate specific provisions in alcohol and cannabis (e.g., by placing similar limits on advertising or hours of sale), yet few chose to do so. All of the local governments we studied permitted alcohol sales, yet only 29% allowed businesses that sell retail cannabis. Localities with bans on retail cannabis tended to have less restrictive alcohol controls, suggesting an inverse, or discordant, relationship.

Notably, only two of 241 local governments in this study chose to regulate the co-location of cannabis outlets in relation to alcohol outlets. Public health researchers have noted that under legalization, new cannabis outlets are often situated in neighborhoods already overburdened with alcohol outlets (Amiri et al., 2019; Shi et al., 2016; Tabb et al., 2018). Failure to regulate co-location could lead to the saturation of legal intoxicants in vulnerable communities, and resulting harms associated with substance use including binge drinking, crime, and cannabis use disorder (Kilmer, 2019; Gruenewald et al., 2006; Gruenewald, 2011b; Campbell et al., 2009; Mair et al., 2021; Freisthler et al., 2016). Because neighborhoods with high densities of both types of outlets are more likely to contain low-income and racial/ethnic minority residents (Amiri et al., 2019; Firth et al., 2020; Shi et al., 2016; Tabb et al., 2018; Unger et al., 2020), coordinating local policies with the explicit goal of deterring alcohol and cannabis outlet co-location is likely to be important for health equity.

The discordance we observed between alcohol and cannabis policies suggests that most local governments in California are not adapting existing alcohol controls to regulate cannabis. This discordance is indicated both by our findings that most local governments ban retail cannabis and that localities permitted retail cannabis sales rarely adopted the same specific provisions for regulating alcohol and cannabis. However, within the subset of 69 local governments (29%)

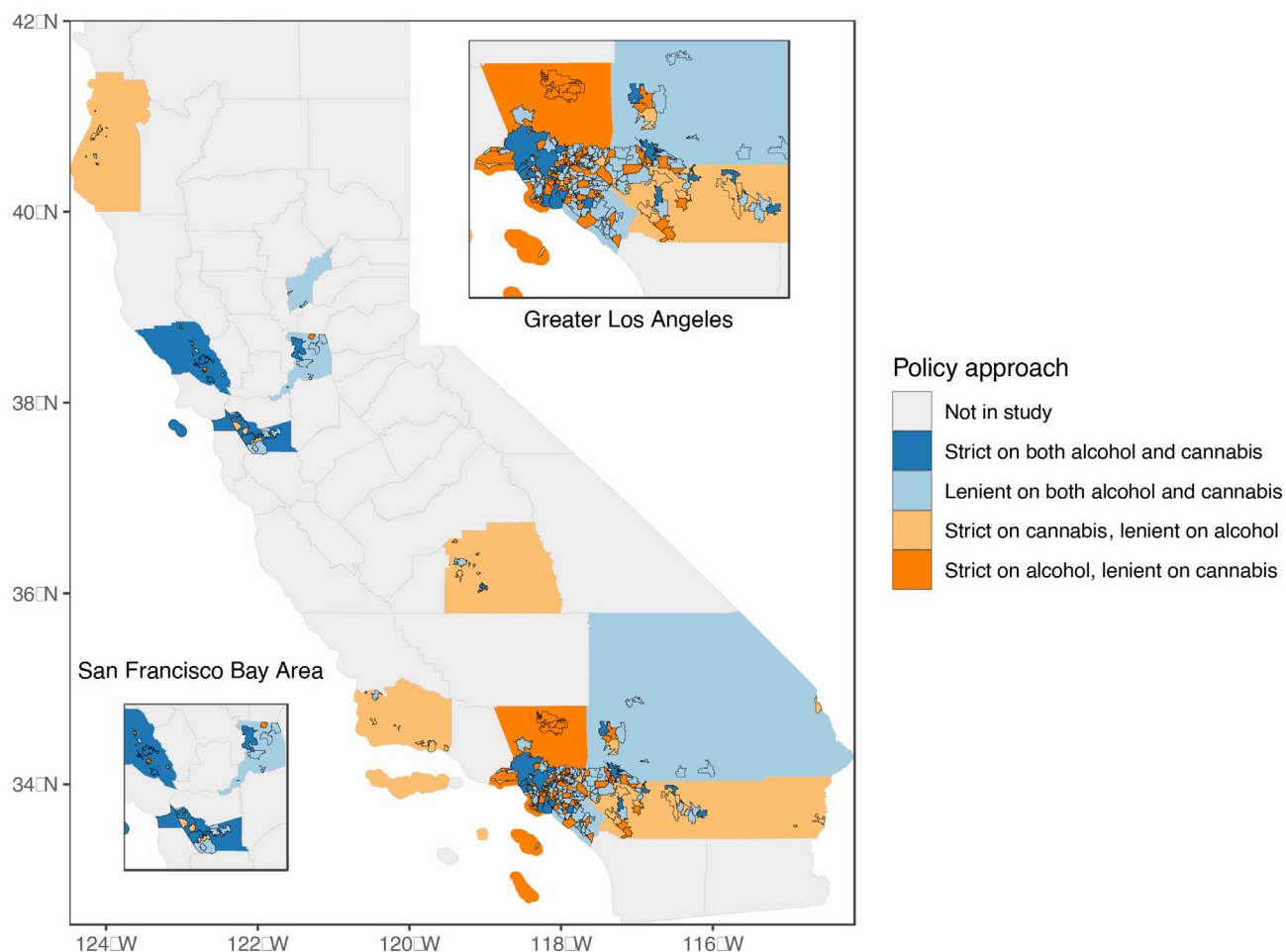


Fig. 2. Overall approaches to alcohol-cannabis control across California cities and counties.

that did not ban retail cannabis businesses, the stringency of alcohol and cannabis policies were positively associated. This suggests local governments with experience regulating both substances may be applying alcohol policies to cannabis (Hecl, 2009; Schmidt et al., 2012). For example, of 90 localities with alcohol-related social host provisions (laws that hold adults responsible for underage consumption occurring on their property), 17 expanded these provisions to cover cannabis. In contrast to alcohol, for which policies have been established for decades, many governments do not yet have the expertise to appropriately regulate cannabis and may choose to ban all cannabis retail to avoid more nuanced decision-making. Public health considerations or NIMBY influences could also be at play in these localities. For the local governments that opened the door to cannabis but lack capacity or expertise, learning from alcohol may offer a way forward.

Modeling cannabis control policies after alcohol may also promote health equity in some contexts. We found that localities that were strict on alcohol but lenient on cannabis had the highest levels of poverty and unemployment and the most Black and Hispanic residents. If lenient cannabis policies lead to cannabis-related health problems, then this demographic patterning in policies implies that health inequities may be exacerbated. For further discussion of these concerns, see Matthay et al. (2022a).

Approximately half (51%) of the localities we studied combined strict cannabis policies with lenient alcohol policies. Linkage to demographic, socioeconomic, political, and retail market characteristics indicated that these communities were distinguished by high social and economic advantages. There is evidence that affluent constituencies are biased toward the status quo, and that policymakers are more likely to be

responsive to their preferences than those of lower-income constituencies (Elkjær, 2020; Erikson, 2015; Gilens, 2005). In addition, conflicting federal and state laws in the US, and the preponderance of cannabis legalization via ballot initiatives (rather than legislation) may interfere with policy coordination, particularly in contexts like the US where governments are more responsive to communities that are already economically advantaged (Mallinson & Hannah, 2020; Rolles, 2018). The political processes that have led to uncoordinated alcohol and cannabis policies in California have the same potential in other places to compromise public health equity by responding only to the wealthiest and most vocal constituents. To promote public health equity, national and subnational governments legalizing recreational cannabis should take proactive measures to counteract these processes.

Our study specifically evaluated California cities and counties which, although specific to the US context, involve the same kinds of policies under consideration or enacted in other countries, including bans or limits on retail sales, limits on outlet density, and taxation. Cannabis policies have changed rapidly in the 21st century, with multiple countries legalizing possession and use. Our finding that California cities and counties rarely took similar approaches to alcohol and cannabis control raises concerns that reliance on subnational governments may compromise the coordination of alcohol and cannabis policies in countries with federalist systems. Consistent with this, a systematic review of policymaker responsiveness found that subnational representatives in both federalist and unitary countries were more likely to respond to constituent pressures that could undermine coordinated policies (Costa, 2017). These issues are relevant to both Brazil and Germany, which in 2022 began reconsidering their existing restrictions on cannabis (Alvares, 2022;

Table 2
Characteristics of California cities and counties with similar and different alcohol-cannabis control approaches.

| Characteristic | Strict on both | Strict on alcohol/ lenient on cannabis | Lenient on alcohol/ strict on cannabis | Lenient on both |
|---|----------------|---|---|-----------------|
| Localities (n [%]) | 50 (21) | 29 (12) | 122 (51) | 40 (17) |
| Demographics | | | | |
| Median age (yrs.) | 36.1 | 36.8 | 38.6 | 38.0 |
| Female (%) | 50.5 | 50.7 | 50.7 | 50.4 |
| Race/ethnicity (%) * | | | | |
| Asian | 8.6 | 3.3 | 9.4 | 2.4 |
| Black | 1.2 | 3.8 | 0.9 | 1.5 |
| Hispanic | 43.0 | 53.0 | 29.2 | 42.3 |
| White | 51.9 | 48.9 | 65.2 | 63.0 |
| Population density (per 10 sq mi) | 9,854 | 10,934 | 7,013 | 5,016 |
| Population mobility and household composition | | | | |
| Population change since 2000 (%) | 8.5 | 12.9 | 5.4 | 8.9 |
| Renters (%) | 37.3 | 45.6 | 28.6 | 35.6 |
| Family households (%) | 79.4 | 70.8 | 76.7 | 67.6 |
| Household size (avg) | 3.2 | 3.1 | 3.0 | 2.8 |
| Socioeconomic characteristics | | | | |
| Educational attainment (%) | | | | |
| High school degree | 20.1 | 20.7 | 18.9 | 22.1 |
| Some college or Associate's degree | 29.0 | 26.1 | 30.8 | 31.2 |
| Bachelor's degree or higher | 19.3 | 19.8 | 26.4 | 16.0 |
| Poverty and income | | | | |
| Income below 150% of federal poverty level (%) | 27.6 | 37.0 | 17.6 | 29.4 |
| Median income (\$) | 63,034 | 57,108 | 82,248 | 55,883 |
| Unemployment rate (%) | 4.7 | 5.3 | 3.9 | 4.7 |
| Crowded housing (%) | 22.7 | 30.3 | 11.7 | 16.7 |
| Density of social organizations (per 10,000 people) | 3,518 | 4,311 | 4,156 | 4,706 |
| Political characteristics | | | | |
| % voting in favor of cannabis legalization (Nov 2016) | 53.0 | 59.0 | 52.5 | 56.0 |
| % voting democratic in 2020 presidential election | 62.4 | 76.1 | 57.2 | 65.6 |
| Retail market characteristics | | | | |
| Alcohol outlet density (per 10,000 people) | | | | |
| Off-premise outlets | 151 | 146 | 150 | 235 |
| Bars/pubs | 63 | 69 | 66 | 108 |
| Restaurants | 10 | 12 | 9 | 20 |
| Cannabis outlets (per 10,000 people) | 86 | 70 | 84 | 99 |
| Density of all retail outlets (per 10,000 people) | 0 | 610 | 0 | 3,059 |
| Service business density (per 10,000 people) | 28,315 | 26,431 | 23,111 | 25,424 |
| Tobacco, payday loan, and pawn shop density (per 10,000 people) | 26,560 | 24,095 | 24,208 | 24,113 |
| Tobacco, payday loan, and pawn shop density (per 10,000 people) | 169 | 176 | 46 | 38 |

Legend: Results reported in this table are for the 238 jurisdictions with non-zero residential populations. *Racial/ethnic categories are not mutually exclusive. Asian, Black, and White racial groups include all people identifying as the corresponding race irrespective of Hispanic identity. The Hispanic group includes people identifying as Hispanic irrespective of racial identity.

Oltermann, 2022). In these countries, monitoring the development of recreational cannabis policies and promoting their coordination with policies regulating other substances is warranted.

Limitations

This study has limitations. Although our analysis touches on universal concerns related to coordination of policies across substances, the legal framework of California may not generalize to other states or countries. Additionally, cannabis control policies are more nuanced than simply permitting or banning retail cannabis. Of particular interest are approaches that permit retail cannabis but constrain commercialization (e.g., Uruguay, Canada), but such approaches were too rare among California localities to be examined separately. Further, the legal frameworks were distinct for alcohol versus cannabis; although we directly compared specific provisions with local discretion for both substances, our comparisons of overall restrictiveness do not account for local protections achieved through state law.

Implications for future research

Our analysis investigated similarities and differences between alcohol and cannabis control policies, but could not definitively identify intentional coordination or barriers to coordination. The limitations of adapting alcohol controls to regulate cannabis should be further explored—for example, needed differences in restrictions on product types

or potency due to differences in formulations, modes of administration, and psychoactive properties of each substance. This analysis does not identify the factors that shaped different policy decisions. Further research is needed on why local governments pursued certain policy approaches and how local policymaking could achieve greater coordination. In particular, for the 12% of localities that were more restrictive on alcohol and less restrictive on cannabis, policymaking may be motivated by the idea that cannabis is harm-reducing substitute for alcohol or opioids.

Future research should also monitor the influence of the rapidly consolidating cannabis industry as a reason that local governments may pursue different policy approaches to alcohol and cannabis control. The financial incentives to advocate for lenient restrictions on cannabis are substantial, and industry interference in legal cannabis policymaking is evident at the national level in the US, New Zealand, and the UK (Adams et al., 2021; Barry & Glantz, 2016, 2018; Gornall, 2020; Subritzky et al., 2016). Studies should also consider best practices of governments that have successfully coordinated alcohol and cannabis control policies, research that has the potential to better inform and direct policymaking worldwide.

Conclusions

Cannabis policies have changed rapidly. In multiple countries, the responsibility for regulating newly legalized cannabis has been granted to subnational governments. In California, the most common response

by local governments given this responsibility was to ban all cannabis businesses from their jurisdictions, suggesting that the policy complexity of retail regulation remains challenging. Lessons learned from regulating alcohol were infrequently applied to cannabis, particularly in jurisdictions with high socioeconomic advantage. Generating data on how governments have successfully aligned policies regulating different substances including alcohol, cannabis, tobacco, and opioids may offer an opportunity to both resolve some of these challenges and improve public health. Given that California represents the world's largest retail cannabis market, continued monitoring of the evolution of local alcohol and cannabis policies and the health and social impacts of the current low levels of coordination is warranted.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Ellicott C. Matthay: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Visualization, Writing – original draft. **Leyla Mousli:** Data curation, Investigation, Validation, Writing – review & editing. **Dorie E. Apollonio:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing. **Laura A. Schmidt:** Conceptualization, Investigation, Project administration, Supervision, Writing – original draft, Writing – review & editing.

Acknowledgements

The authors thank Sue Thomas, Ryan Treffers, Catherine Mueller, and Laura Rambaran for their guidance and contributions to collecting and coding the cannabis policy data.

Funding

This work was supported by the National Institute on Alcohol Abuse and Alcoholism [grant number K99/R00 AA028256], the University of California Office of the President Cancer Research Coordinating Committee [grant number C21CR2029], the California Bureau of Cannabis Control [grant number RG-1603070583-553], and the National Institute on Drug Abuse [grant number DA046051].

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.drugpo.2023.104114.

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