Cannabis retailer marketing strategies and regulatory compliance: A surveillance study of retailers in 5 US cities

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Abstract

As cannabis retail expands in the US, its surveillance is crucial to inform regulations and protect consumers. This study addresses this need by conducting point-of-sale audits examining regulatory compliance (e.g., age verification, signage), advertising/promotional strategies, products, and pricing among 150 randomly-selected cannabis retailers in 5 US cities (30/city: Denver, Colorado; Seattle, Washington; Portland, Oregon; Las Vegas, Nevada; Los Angeles, California) in Summer 2022. Descriptive and bivariate analyses characterized the retailers overall and across cities. Age verification rates were high (>90%). The majority of retailers had signage indicating restricted access (e.g., no minors; 87.3%), onsite consumption (73.3%), and distribution to minors (53.3%). Retailers were likely to post warnings regarding use during pregnancy/breastfeeding (72.0%), followed by health risks (38.0%), impacts on children/youth (18.7%), and DUI (14.0%). Overall, 28.7% posted health claims, 20.7% posted youth-oriented signage, and 18.0% had youth-oriented packaging. Price promotions were prevalent, particularly price specials (75.3%), daily/weekly/monthly specials (66.7%), and membership programs (39.3%). One-fourth had signs/promotions indicating curbside delivery/pick-up (28.0%) and/or online ordering (25.3%); 64.7% promoted their website or social media page. The most potent cannabis products were most often e-liquids (38.0%) or oils (24.7%); the least potent were often edibles (53.0%). The most expensive product was often bud/flower (58.0%); the least was joints (54.0%). The vast majority (81%) sold vaporizers, wrapping papers, and hookah/waterpipes/bongs, and 22.6% sold CBD products. Marketing strategies differed across cities, reflecting differences in state-specific regulations and/or gaps in compliance/enforcement. Findings underscore the need for ongoing cannabis retail surveillance to inform future regulatory and enforcement efforts.

Keywords

INTRODUCTION

Despite federal prohibition of cannabis, 21 states and 3 territories (including the District of Columbia) have legalized recreational use, and ~40 states and 4 territories have legalized medical use as of November 2022.[1] Cannabis retail sales have rapidly increased in the US, from ~$10 billion in 2019 to over $20 billion in 2021,[2] and are estimated to be ~$25 billion in 2025.[3]

Marketing efforts (i.e., product offerings, pricing, promotions) are critical for consumer uptake, attracting new users, promoting continued use, building brand loyalty, and shaping consumer perceptions, particularly for novel products.[4] Tobacco and alcohol research shows

robust associations between exposure to retail marketing and use;[5–9] similar findings are emerging regarding cannabis.[10–15] Marketing surveillance tools have been critical in informing tobacco and alcohol retail, and early cannabis surveillance protocols and tools are increasingly relevant and necessary in public health research[16–20] and practice[17] to address cannabis retail.

A major component of retail surveillance is monitoring products and their attributes, such as packaging and price. Cannabis retailers offer products diverse in their effects, depending on CBD vs. THC levels, strain (i.e., indica, sativa, hybrid), and mode of use (e.g., smoked, vaporized, ingested, applied topically).[14,19,21–24] Product packaging promotes product attributes and articulates proper use (i.e., serving size, potency).[25,26] Influential product attributes include higher CBD (among users and nonusers), higher THC, higher quality, and lower price.[27,28] Relatedly, product pricing and price promotions impact consumer purchasing behaviors and are commonly used among retailers.[22,23,29] For example, prevalent price promotion strategies at cannabis retailers include coupons, price reductions, daily/ weekly deals, "buy one, get one free" promotions, giveaways or free samples, loyalty club memberships, and promotions via social media.[22,24,30]

A major regulatory issue is underage access and marketing exposure. While some research indicates high age verification rates among cannabis retailers,[22,23,31,32] a 2019 California-based study found that only 12% of retailers checked ID before entry,[33] and more than one-third marketed youth-oriented items,[33] particularly prominent among cannabis retailers near schools,[16] coinciding with other evidence.[32] Also, a 2016 study of dispensaries across 10 states found that ~30% offered online ordering, and 21% offered delivery services,[24] which may facilitate underage access.[34]

A related concern is the targeting of certain subpopulations. Evidence suggests that licit drug retailers[35–40] (including cannabis retailers[35–37,39,40]) cluster in neighborhoods with high proportions of young adults, racial/ethnic minorities, sexual/gender minorities, and low-income individuals, and may vary their marketing strategies to target these subpopulations.[21,38,41–43] These strategies impact substance use.[44–47]

Another concern is that the diversity and nature of products has implications for advertising messaging, particularly related to health claims.[18,22–24] For example, a 2019 POS audit study in California found that ~40% of retailers promoted the health benefits of cannabis.[33] Other studies of cannabis retail websites found that over half (61–67%) made inaccurate health benefit claims while omitting potential side effects.[18,24]

Cannabis regulatory frameworks are evolving and require additional sophistication based on the nuances of cannabis retail.[21,48–55] This work can be informed by prior work in licit drug retail,[21] as well as the early experiences of US recreational cannabis retail.[21,48–55] Based on these experiences, state laws address various factors; for example, they may prohibit/ restrict marketing targeting those underage and using health claims, online sales and/or delivery, and/or customer discounts.[55] However, the literature highlights concerns related to noncompliance and underscores the need for cannabis retail and marketing surveillance to inform regulatory and enforcement efforts. Thus, this study examined regulatory compliance

and marketing practices among cannabis retailers in 5 cities in different US states with different recreational cannabis regulations.

METHODS

Study Overview

The current study conducted primary data collection and analysis as part of the <u>C</u>annabis <u>R</u>egulation, <u>M</u>arketing & <u>A</u>ppeal (CARMA) study. CARMA was launched in Spring 2022 and examines recreational cannabis retail, marketing, and consumer impact. The current study focuses on cannabis marketing in 5 cities with well-established recreational cannabis markets: Denver, Colorado (established in January 2014); Seattle, Washington (July 2014); Portland, Oregon (October 2015); Las Vegas, Nevada (July 2017); and Los Angeles (LA), California (January 2018). Supplementary Table 1 summarizes key state policies.

In Spring 2022, locations with recreational retail licenses in these 5 cities were identified using data from the respective state cannabis regulatory agency websites (n=641). Online searches and phone calls were conducted to verify whether the license referred to an open brick- and-mortar storefront (n=561), and had a website not including social media, Leafly, Weedmaps, etc. (related to website audits also included in this study;[56] n=541, of which 372 were distinct). We then randomly selected 150 retailers (30/city) not part of the same chain. Specifically, all eligible retailers in each city were assigned a number using a random number generator and then listed chronologically. The top 30 in each city were selected for audits; replacement stores (as needed) were chosen from the remainder of the list (starting at number 31 and chronologically thereafter). See Supplementary Figure 1 for the retailer flowchart.

Data Collection

Training & Quality Control.—In July–August 2022, data collection was conducted in LA, Las Vegas, Denver, Portland, and Seattle, respectively. Data collectors were 6 research staff (ages 22–25, female). Each cannabis retailer was visited twice, with mystery shopper and POS assessments conducted 1–3 days apart. Mystery shopper assessments were conducted by individual staff; POS audits were conducted by staff pairs to assess inter-rater reliability. Data were recorded via electronic forms on iPads/iPhones.

Prior to data collection (July 2022), staff participated in a 2-day training, involving didactics, mock audits, field practice, group debriefing, and quizzes. Once data collection began in each city, staff met with the first and second authors (CB, KR) within the first day to address any issues and ensure data quality.

Mystery Shopper Assessment.—Using previously-published strategies,[57] staff entered each retailer without identifying as research staff to retail personnel or customers. They coded if they were asked for and required to show their government-issued identification while at the store (i.e., immediately to enter, later, never). After leaving, they assessed whether there were key facilities (e.g., schools, parks/playgrounds, public transit, see Table 1 for complete list) within 2 blocks (radius) from the retailer, as several states have zoning restrictions related retailers locating within 1,000 feet of youth-oriented facilities, etc.

Point-of-Sale (POS) Assessment.—Adapted from previously-published brick-and-mortar[22,23] and online[24] cannabis retail audit protocols, the POS assessment tool (duration 15–45 minutes) assessed: retailer characteristics; regulation-related factors; cannabis advertisement and promotion; cannabis product availability and prices; and other products sold/advertised; see Tables 1–4 for details regarding all codes for each assessment summarized below. After data collection was complete, the staff pairs discussed and reconciled all discrepancies.

Retailer characteristics.: POS auditors coded: store type (i.e., recreational-only, recreational/medicinal); building/structure type (e.g., storefront); structural features (e.g., security cameras/guards, attached to consumer lounge); media types for outside the store (e.g., light-up signs, digital signs) and inside the store (e.g., chalkboards/whiteboards, TV/other screens); and forms of payment accepted (e.g., cash, credit card).

Regulation-related factors.: POS auditors recorded whether they were asked to *provide their ID* (as with mystery shoppers) and whether anyone was *using cannabis* inside or outside the store, or seemed intoxicated inside the store.

For both inside and outside (separately), POS auditors also recorded: *regulation-related signage* posted (e.g., retail license posted; no minors; no onsite consumption); *warning-related signage* (e.g., pregnancy/breastfeeding; driving under the influence [DUI]; harm to health); and visibility of these signs (e.g., difficult to see because of location).

Cannabis product advertisement/promotion.: POS auditors coded: ads/signs indicating *health benefits/claims*; *youth-oriented signs; youth-oriented packaging*; and signs/promotions targeting *special populations* (e.g., teens/young adults, LGBTQ+; see Supplementary Table 2 for codes and code definitions/examples). "Health benefits/claims" and "youth-oriented" were defined referencing states' definitions (see Supplementary Table 1).

POS auditors also coded (for inside and outside) whether there were *cannabis product ads/signage* indicating: price promotions; showing actual cannabis use; emphasizing "research"; promoting free products; celebrity endorsements; etc. They also assessed *cannabis price promotions* (e.g., daily/weekly/monthly specials) and signage regarding *online sales and/or delivery*. Additional assessments included other promotional messages (e.g., website or social media promotion) and take-away materials (e.g., product menus).

Cannabis product availability and prices.: POS auditors coded cannabis products sold (e.g., bud/flower; joints/pre-rolled; e-liquids; edibles), as well as the *potency* and form of the most and least potent products sold. They also coded the *most and least expensive* cannabis product sold (per dose) and the respective cost (pre-tax).

Other products sold/advertised.: POS auditors assessed whether the store sold *paraphernalia, apparel, or other outside products* (e.g., glassware, apparel), and if available, content the paraphernalia/apparel featured (e.g., store itself, targeting specific populations). They also coded *other products* sold (e.g., CBD, delta-8 THC), and related ads.

Data Analysis

Analyses were conducted using SPSS v28.0 and alpha=.05. To determine initial inter-rater reliability, we computed kappas for categorical variables and intra-class correlations (ICCs) for continuous variables. Almost all initial kappa values exceeded .70 (representing good agreement), with very few below .40 (adequate agreement; i.e., products highest/lowest in potency of .27).[58] Descriptive and bivariate analyses (Chi-square tests, Fisher's exact tests) were used to characterize the sample and differences across cities.

RESULTS

Regulatory Compliance & Regulation-related Signage

Table 1 provides an overview of retailer characteristics (62.7% recreational/medical, 37.3% recreational). Retailers were found within 2 blocks of youth-oriented facilities (schools: 14.3%; parks/playgrounds: 8.6%), most frequently in LA (where the required distance was 600 feet vs. 1,000 feet elsewhere, e.g., 53.3% for schools in LA vs. <10% elsewhere, p's<.001, Table 2). Retailers were also located within 2 blocks of public transportation (14.3%) and other locations related to licit drug consumption (bars/pubs/clubs: 30.0%, liquor stores: 11.4%; other cannabis retailers: 7.1%).

Mystery shoppers were required to show ID immediately upon entry at 89.9% of retailers; 2.9% asked later and 6.5% never asked, most frequently in Portland (27.6% vs. <3% elsewhere, p<.001), despite no differences in age-verification regulations. This pattern was similar for POS auditors (91.3% immediately, 2.0% later, 6.5% never, most frequently in Portland). In all sites except LA, onsite consumption (inside or outside) was prohibited. Intoxicated patrons were suspected at 4.7%, and on-premise cannabis use inside and outside was 0.7% and 4.0%, respectively (4.2%, 0%, and 3.3% excluding LA).

All states but California required signage indicating restricted access and no onsite consumption, which was posted in 87.3% and 73.3% (97.5% and 81.7% excluding LA); Denver retailers least frequently posted no onsite consumption signs (26.7% vs. 73.3% elsewhere, p<.001). Nevada was the only state that required signs indicating no distribution to minors, yet 53.3% of all retailers posted such signs, most frequently in Las Vegas (70.0%), Seattle (93.3%), and Portland (66.7%, p<.001). Nevada was also the only state that required signage indicating purchase/possession limits and no transport across state lines; this occurred in 86.7% and 73.3% of Las Vegas retailers, respectively, but infrequently elsewhere (50% and 43.3%; overall 31.3% and 25.3%, p<.001). Colorado was the only state that required signage indicating right to refuse service to those intoxicated, but this signage occurred infrequently among Denver retailers (10.0%) and overall (22.7%).

All 5 states required health warning signage regarding use during pregnancy, found in 72.0% of retailers, least frequently in Las Vegas (43.3%), LA (66.7%), and Denver (66.7%, p<.001). Health harms signage, only required in California, was found in 38.0% of retailers; this occurred most frequently in LA (70.0%) and Seattle (93.3% vs. 20% elsewhere, p<.001). Only 18.7% posted warning signage indicating negative impacts on children/youth, only required in Nevada where 33.3% were compliant. Colorado and Nevada required DUI warning signage, which occurred in 14.0% overall, 30.0% in Denver, and 10.0% in Las

Vegas (p<.001). Very few (<6%) posted warning signage related to child access, addiction, other physical/mental health risks, amount of THC cautions, overconsumption, serving size cautions, negative interactions with alcohol/drugs, or poisoning. In 20.7%, regulation-related signage was difficult to see due to the location posted, most frequently in Las Vegas (43.3%) and LA (33.3% vs. 13.3% elsewhere, p<.001).

Advertising & Promotional Strategies

Although Colorado, Washington, and Oregon explicitly prohibited health claims in advertising, 28.7% had signage with health claims (17.3% excluding LA and Las Vegas; Table 3). Additionally, 20.7% displayed youth-oriented signage, and 18.0% youth-oriented packaging (most frequently in Denver: 43.3% and 53.3% vs. 20% elsewhere, p's<.01).

Other specially-targeted populations included LGBTQ+ (10.7%) and teens/young adults (9.3%, most often in Denver, 30.0% vs. 6.7% elsewhere, p<.001). Ad content featured various messaging/imagery; 15.3% depicted pop culture, 14.7% research/science, 8.7% actual use, and 7.3% celebrity endorsements. Despite all states but Colorado prohibiting free samples, 5.3% posted ads indicating free products/giveaways (7.5% excluding Denver).

While only 11.3% posted exterior signage indicating cannabis price promotions, large proportions used general price specials (75.3%) and daily/weekly/monthly specials (66.7%), 39.3% membership programs (particularly in Denver [60.0%] and Las Vegas [56.7%]), 13.3% drawings/raffles, 12.7% happy hour specials, 8.0% giveaways, and 15.3% almost free products (i.e., <$1, product in exchange for donation).

Overall, 28.0% had signs/promotions indicating curbside delivery/pick-up, most frequently in Las Vegas (56.7%) and Seattle (33.3%). Online ordering and home delivery were promoted by 25.3% and 13.4%. Washington was the only state of the 5 that prohibited online ordering and home delivery; while home delivery was not indicated at any Seattle retailer, online ordering was documented in 56.7% of Seattle retailers – the highest proportion of retailers across cities. Two-thirds (64.7%) promoted their website or social media page, 52.7% provided product menus, and 38.0% circulated product/brand flyers.

Products & Pricing

All retailers sold bud/flower, joints, e-liquids, edibles, and oils, >90% sold hash, topicals, beverages, and tinctures, and <5% sold clones or seeds (Table 4). The most potent products sold were frequently e-liquids (38.0%) or oils (24.7%), with potency ranging from 93% THC (Denver) to 99% THC (elsewhere), and 600 mg THC (Seattle) to 3500 mg THC (Las Vegas and LA; not in tables), exceeding limits imposed in Washington and Oregon. The least potent product sold was frequently edibles (53.0%), with potency ranging from 1% THC (Las Vegas) to 6% THC (Denver), and 0.25 mg THC (Denver) to 1 mg THC (Las Vegas).

The most expensive product was frequently bud/flower (58.0%), and ranged from $35.00 (Denver) to $500 (Seattle; not in tables). The least expensive product was frequently single joints (54.0%) or edibles (23.3%), and ranged from $1.00 (Portland) to $20.00 (LA).

Almost all (92%) sold vaporizers and wrapping papers, 81.3% hookah/waterpipes/bongs, 56.0% other glassware, and 62.0% apparel. Among those with paraphernalia/apparel, content featured on paraphernalia/apparel included: store (57.3%), cannabis brand (11.3%), and images/language targeting specific populations (e.g., LGBTQ+; 2.0%). Regarding other consumable substances, in all sites, CBD products were allowed; all but Seattle and Las Vegas allowed synthetic THC. In this sample, 22.6% sold CBD products, and 1 sold delta-8/O/10 (LA); other products were rarely sold. There were no ads for other products, except 7.3% CBD.

DISCUSSION

This study yielded novel, timely data regarding regulatory compliance and marketing among cannabis retailers in 5 US cities with different state regulations regarding cannabis retail. Findings underscore concerns regarding regulatory compliance, targeting of young people, underage access, and the diversity of cannabis products, pricing strategies, and advertising efforts.

Roughly 10% of cannabis retailers were found within 2 blocks of youth-oriented facilities (e.g., schools, parks/playgrounds), which more often occurred in LA, where zoning restrictions were shorter (600 vs. 1,000 ft). This is concerning, as retailers near such locations are particularly likely to have products appealing to youth,[16] and about one-fifth of retailers in this sample had youth-oriented signage/packaging and/or content appealing to teens/young adults. These issues were most represented in Denver, despite Colorado's regulatory language being similar to or more specific than that of the other 4 states. Ads also referenced pop culture and/or used celebrity endorsements, and nearly one-tenth posted ads depicting cannabis use, which raise concerns about impact on young people.[21,29,59,60]

Furthermore, two-thirds of retailers promoted their website or social media page, and although many social media platforms prohibit paid cannabis advertising, several loopholes enable cannabis retailer promotion via social media, which has high reach to those underage.[61] These findings are concerning given that cannabis marketing exposure predicts positive attitudes towards cannabis and use onset.[10–15] In addition, similar to rates noted previously,[24] over one-fourth of retailers had signs/promotions indicating curbside delivery/pick-up and/or online ordering, and over one-tenth promoted home delivery. These services raise concerns regarding underage access, due to ease of bypassing age verification.[34] Unlike the other states, Washington prohibited home delivery and online sales. Accordingly, no home delivery was documented in Seattle; however, online ordering was particularly prevalent in Seattle, as well as Denver. Despite concerns related to underage targeting and access, rates of age verification upon entry were high (~90%), similar to prior research.[22,23,31,32] Noncompliance was most frequently in Portland, although there were no major differences in age verification related regulations.

Noncompliance with required signage was common. Compliance with signage regarding restricted access and onsite consumption, required in all 5 states except California, was high on average, but ~75% of Denver retailers were noncompliant with the onsite consumption signage. Las Vegas retailers demonstrated relatively high rates of compliance

with Nevada-specific required signs (i.e., no distribution to minors, limits on purchase amounts, prohibited transportation across state lines,   70%), while Denver retailers showed low rates of compliance with Colorado-specific required signage (i.e., right to refuse service to those intoxicated, 10%). Regarding state-required warning signage, >25% of retailers lacked warnings related to use during pregnancy (required in all 5 states; particularly low compliance in Las Vegas, LA, and Denver), >80% of Las Vegas retailers lacked warning signs regarding the negative impacts on children, 90% of Las Vegas retailers and 70% of Denver retailers lacked state-required DUI warning signs, and 30% of LA retailers lacked California-required health risk warning signs. Very few (<6%) posted warnings regarding child access, addiction, consumption-related risks/cautions, etc., and in general, the prevalence of warning signage was lower where it was not required. One question is the impact of such signage – especially given the wide range in the number of state-required regulatory and warning signage – with Nevada requiring the most signage and California requiring the least. The evidence has been mixed for such regulatory[62–64] and health warning signage,[65–67] and little research has examined how much information can be comprehended by consumers,[68] particularly at point-of-sale. Thus, one important are of future research is examining what information – and how much – is most effectively attended to and comprehended by consumers.

Over one-fourth of retailers posted signage with cannabis health claims, which may be an underestimation of health claim messaging being conveyed at the point-of-sale, as suggested by mystery shopper studies.[57,69] For example, mystery shopper research conducted in these 5 cities documented that 95.0% endorsed use for anxiety, 93.6% insomnia, 97.9% pain, and 54.3% pregnancy-related nausea.[70] Interestingly, there were no differences in the prevalence of health claims in states with vs. without such prohibitions. This regulatory concern has been documented in prior research[24] and represents an ongoing regulatory challenge.

Findings indicated the wide variety of products sold, in terms of cost, form/mode, and potency (among other factors), suggesting a broad range of factors likely playing a role in consumer decisions among various consumer segments.[27,28] We also documented extremely high potencies (up to 99% THC or 3500 mg THC), underscoring noncompliance in 2 sites with potency limits, and more general concerns about the availability and implications of these high-potency products.[71] Regarding other products, most retailers sold products to facilitate cannabis use (e.g., vaporizers, wrapping papers, glassware), but rarely other consumable products (e.g., synthetic THC).

Cannabis price promotions were prevalent and most frequently included general price specials, daily/weekly/monthly specials, and membership programs, consistent with prior research.[22,24,30] Additionally, 5–8% promoted and/or offered free products/giveaways. The prevalence of price-minimizing strategies is concerning, given their impact on use,[72,73] particularly among more price-sensitive subpopulations (e.g., young adults, women, lower-income individuals).[74]

Limitations

Limitations include retailer representativeness and generalizability of findings, given that this was a randomly-selected sample of 150 retailers in 5 US cities. Moreover, as

noted in Supplementary Table 1, not all regulations in each state were clearly specified; thus, in presenting findings, we used caution in asserting compliance vs. noncompliance. Additionally, specific audit forms were not created for each site; thus, assessments of such factors (e.g., health claims, youth-oriented signage) used definitions from core concepts across state regulatory language. Another limitation is that proximity to specific locations (e.g., schools) was based on mystery shopper surveillance of the 2-block radius from each retailer, a common method used in systematic social observation studies as a practical way to conduct in-the-field data collection.[75] However, this distance does not perfectly reflect the 1,000-foot radius relevant to several state zoning regulations. Nonetheless, study strengths include the inclusion of a relatively large and diversified sample across states and providing timely data regarding cannabis retail practices and marketing across several cities with different regulations.

Conclusions

Current findings highlight concerns about regulatory compliance and marketing strategies used by cannabis retailers, particularly their impact on young people. We documented suboptimal age verification rates, noncompliance with required signage, marketing content targeting young people and other key populations (LGBTQ+), and promotional activities that may impact subpopulations differently. While some differences across cities reflected variations in regulations, others did not, potentially indicating implementation and enforcement gaps. Thus, as cannabis markets emerge and evolve, ongoing surveillance is necessary to inform cannabis retail regulatory efforts, including enforcement, and to protect consumers.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

REFERENCES

1. Hansen CA, Horus Davis Jr., Elliott. Where Is Marijuana Legal? A Guide to Marijuana Legalization. Accessed November 1, 2022. https://www.usnews.com/news/best-states/articles/where-is-marijuana-legal-a-guide-to-marijuana-legalization

2. McVey E Exclusive: US retail marijuana sales on pace to rise 40% in 2020, near $37 billion by 2024. Accessed October 9, 2022. https://mjbizdaily.com/exclusive-us-retail-marijuana-sales-on-pace-to-rise-40-in-2020-near-37-billion-by-2023/

3. Blake DK. Marijuana Statistics 2020, Usage, Trends and Data. 2020. https://americanmarijuana.org/marijuana-statistics/

4. American Marketing Association. Definition of marketing. Accessed January 16, 2008. http://www.marketingpower.com/AboutAMA/Pages/DefinitionofMarketing.aspx

5. Hastings G, Anderson S, Cooke E, Gordon R. Alcohol marketing and young people's drinking: A review of the research. Journal of Public Health Policy. 2005;26(3):296–311. doi:10.1057/palgrave.jphp.3200039 [PubMed: 16167558]

6. Anderson P, de Bruijn A, Angus K, Gordon R, Hastings G. Impact of Alcohol Advertising and Media Exposure on Adolescent Alcohol Use: A Systematic Review of Longitudinal Studies. Alcohol and Alcoholism. May-Jun 2009;44(3):229–243. doi:10.1093/alcalc/agn115 [PubMed: 19144976]

7. Robertson L, McGee R, Marsh L, Hoek J. A systematic review on the impact of point-of-sale tobacco promotion on smoking. Nicotine Tob Res. Jan 2015;17(1):2–17. doi:10.1093/ntr/ntu168 [PubMed: 25173775]

8. Cruz TB, Rose SW, Lienemann BA, et al. Pro-tobacco marketing and anti-tobacco campaigns aimed at vulnerable populations: A review of the literature. Tob Induc Dis. 2019;17:68. doi:10.18332/tid/111397 [PubMed: 31582956]

9. Lee JG, Henriksen L, Rose SW, Moreland-Russell S, Ribisl KM. A systematic review of neighborhood disparities in point-of-sale tobacco marketing. American journal of public health. 2015;105(9):e8–e18.

10. Jackson KM, Janssen T, Gabrielli J. Media/marketing influences on adolescent and young adult substance abuse. Current addiction reports. 2018;5(2):146–157. [PubMed: 30393590]

11. Trangenstein PJ, Whitehill JM, Jenkins MC, Jernigan DH, Moreno MA. Cannabis Marketing and Problematic Cannabis Use Among Adolescents. J Stud Alcohol Drugs. Mar 2021;82(2):288–296. doi:10.15288/jsad.2021.82.288 [PubMed: 33823976]

12. Cabrera-Nguyen EP, Cavazos-Rehg P, Krauss M, Bierut LJ, Moreno MA. Young Adults' Exposure to Alcohol- and Marijuana-Related Content on Twitter. Journal of Studies on Alcohol and Drugs. Mar 2016;77(2):349–353. [PubMed: 26997194]

13. Cavazos-Rehg P, Krauss M, Grucza R, Bierut L. Characterizing the followers and tweets of a marijuana-focused Twitter handle. J Med Internet Res. 2014;16(6):e157. doi:10.2196/jmir.3247 [PubMed: 24974893]

14. Krauss MJ, Sowles SJ, Sehi A, et al. Marijuana advertising exposure among current marijuana users in the U. S. Drug Alcohol Depen. 2017;172(1):192–200.

15. Paschall MJ, Grube JW. Recreational Marijuana Availability in Oregon and Use Among Adolescents. Am J Prev Med. Feb 2020;58(2):e63–e69. doi:10.1016/j.amepre.2019.09.020 [PubMed: 31959327]

16. Cao Y, Carrillo AS, Zhu SH, Shi Y. Point-of-Sale Marketing in Recreational Marijuana Dispensaries Around California Schools. J Adolesc Health. Jan 2020;66(1):72–78. doi:10.1016/j.jadohealth.2019.07.023 [PubMed: 31604606]

17. Nicholas W, Washburn F, Lee G, Loprieno D, Greenwell L, Berg C. Assessing the Retail Environments of Licensed and Unlicensed Cannabis Dispensaries: Adapting the Marijuana Retail Surveillance Tool to Inform Cannabis Regulation in Los Angeles County. J Public Health Manag Pract. Aug 6 2020;doi:10.1097/PHH.0000000000001224

18. Bierut T, Krauss MJ, Sowles SJ, Cavazos-Rehg P. Exploring Marijuana Advertising on Weedmaps, a Popular Online Directory. Prevention Science. 2017;18(2):183–192. [PubMed: 27534665]

19. Luc MH, Tsang SW, Thrul J, Kennedy RD, Moran MB. Content analysis of online product descriptions from cannabis retailers in six US states. Int J Drug Policy. Jan 2020;75:102593. doi:10.1016/j.drugpo.2019.10.017 [PubMed: 31794923]

20. Whitehill JM, Trangenstein PJ, Jenkins MC, Jernigan DH, Moreno MA. Exposure to Cannabis Marketing in Social and Traditional Media and Past-Year Use Among Adolescents in States With Legal Retail Cannabis. J Adolesc Health. Feb 2020;66(2):247–254. doi:10.1016/j.jadohealth.2019.08.024 [PubMed: 31708374]

21. Berg CJ, Henriksen LA, Cavazos-Rehg P, Haardoerfer R, Freisthler B. The emerging marijuana retail environment: Key lessons learned from tobacco and alcohol retail research. Addictive Behaviors. 2018;81:26–31. [PubMed: 29421347]

22. Berg CJ, Henriksen LA, Cavazos-Rehg P, Schauer GL, Freisthler B. The Development and Testing of the Marijuana Retail Surveillance Tool (MRST): Assessing Marketing and Point-of-Sale Practices Among Recreational Marijuana Retailers. Health Education Research. 2017;32(6):465–472. [PubMed: 29237032]

23. Berg CJ, Henriksen LA, Cavazos-Rehg PA, Schauer G, Freisthler B. Point-of-Sale Marketing and Context of Marijuana Retailers: Assessing Reliability and Generalizability of the Marijuana Retail Surveillance Tool. Preventive Medicine Reports. 2018;11(2018):37–41. [PubMed: 29984136]

24. Cavazos-Rehg PA, Krauss MJ, Cahn E, et al. Marijuana Promotion Online: an Investigation of Dispensary Practices. Prev Sci. Apr 9 2018;doi:10.1007/s11121-018-0889-2

25. Goodman S, Hammond D. Does Unit-Dose Packaging Influence Understanding of Serving Size Information for Cannabis Edibles? J Stud Alcohol Drugs. Mar 2020;81(2):173–179. [PubMed: 32359046]

26. Leos-Toro C, Fong GT, Meyer SB, Hammond D. Cannabis labelling and consumer understanding of THC levels and serving sizes. Drug Alcohol Depend. Mar 1 2020;208:107843. doi:10.1016/j.drugalcdep.2020.107843 [PubMed: 32044091]

27. Shi Y, Cao Y, Shang C, Pacula RL. The impacts of potency, warning messages, and price on preferences for Cannabis flower products. Int J Drug Policy. Dec 2019;74:1–10. doi:10.1016/j.drugpo.2019.07.037 [PubMed: 31382201]

28. Zhu B, Guo H, Cao Y, An R, Shi Y. Perceived Importance of Factors in Cannabis Purchase Decisions: A Best-worst Scaling Experiment. Int J Drug Policy. May 29 2020:102793. doi:10.1016/j.drugpo.2020.102793 [PubMed: 32482489]

29. Hoeper S, Crosbie E, Holmes LM, et al. "The Perfect Formula:" Evaluating Health Claims, Products and Pricing on Cannabis Dispensary Websites in Two Recently Legalized States. Substance Use & Misuse. 2022:1–8.

30. Buller DB, Woodall WG, Saltz R, Starling R. Pseudo-Underage Assessment of Compliance With Identification Regulations at Retail Marijuana Outlets in Colorado. J Stud Alcohol Drugs. Nov 2016;77(6):868–872. [PubMed: 27797687]

31. Buller DB, Woodall WG, Saltz R, Buller MK. Compliance With Personal ID Regulations by Recreational Marijuana Stores in Two U.S. States. J Stud Alcohol Drugs. Nov 2019;80(6):679–686.

32. Lenk KM, Wiens T, Fabian W, Erickson DJ. Practices and policies of marijuana retail stores in the first two US states to legalize recreational marijuana sales. Drugs: Education, Prevention and Policy. 2020;doi:DOI: 10.1080/09687637.2020.1822781

33. Shi Y, Pacula RL. Assessment of recreational cannabis dispensaries' compliance with underage access and marketing restrictions in California. JAMA pediatrics. 2021;175(11):1178–1180. [PubMed: 34398218]

34. Gaiha SM, Lempert LK, Halpern-Felsher B. Underage Youth and Young Adult e-Cigarette Use and Access Before and During the Coronavirus Disease 2019 Pandemic. JAMA Network Open. 2020;3(12):e2027572–e2027572. doi:10.1001/jamanetworkopen.2020.27572 [PubMed: 33270127]

35. Shi Y, Meseck K, Jankowska MM. Availability of Medical and Recreational Marijuana Stores and Neighborhood Characteristics in Colorado. J Addict. 2016;2016:7193740. doi:10.1155/2016/7193740 [PubMed: 27213075]

36. Thomas C, Freisthler B. Examining the locations of medical marijuana dispensaries in Los Angeles. Drug Alcohol Rev. May 2016;35(3):334–7. doi:10.1111/dar.12325 [PubMed: 26423794]

37. Morrison C, Gruenewald PJ, Freisthler B, Ponicki WR, Remer LG. The economic geography of medical cannabis dispensaries in California. Int J Drug Policy. May 2014;25(3):508–15. doi:10.1016/j.drugpo.2013.12.009 [PubMed: 24439710]

38. Lee JGL, Henriksen L, Rose SW, Moreland-Russell S, Ribisl KM. A Systematic Review of Neighborhood Disparities in Point-of-Sale Tobacco Marketing. American Journal of Public Health. Sep 2015;105(9):E8–E18. doi:10.2105/Ajph.2015.302777

39. Unger JB, Vos RO, Wu JS, et al. Locations of licensed and unlicensed cannabis retailers in California: A threat to health equity? Prev Med Rep. Sep 2020;19:101165.doi:10.1016/j.pmedr.2020.101165 [PubMed: 32714779]

40. Novak P, Sanmartin MX, Ali MM. Geolocation of Maryland Medical Marijuana Dispensaries by Community Income and Racial Characteristics: An Ecological Design. Subst Use Misuse. 2021;56(2):318–326. doi:10.1080/10826084.2020.1868516 [PubMed: 33427008]

41. Kuo M, Wechsler H, Greenberg P, Lee H. The marketing of alcohol to college students: the role of low prices and special promotions. Am J Prev Med. Oct 2003;25(3):204–11.

42. Cooke A, Freisthler B, Mulholland E. Examination of Market Segmentation among Medical Marijuana Dispensaries. Substance Use and Misuse. 2018;

43. Kepple NJ, Freisthler B. Place over traits? Purchasing edibles from medical marijuana dispensaries in Los Angeles, CA. Addict Behav. Oct 2017;73:1–3. doi:10.1016/j.addbeh.2017.04.010 [PubMed: 28412327]

44. Novak SP, Reardon SF, Raudenbush SW, Buka SL. Retail tobacco outlet density and youth cigarette smoking: a propensity-modeling approach. Am J Public Health. Apr 2006;96(4):670–6. doi:10.2105/AJPH.2004.061622 [PubMed: 16507726]

45. Chuang YC, Cubbin C, Ahn D, Winkleby MA. Effects of neighbourhood socioeconomic status and convenience store concentration on individual level smoking. J Epidemiol Community Health. Jul 2005;59(7):568–73. doi:10.1136/jech.2004.029041 [PubMed: 15965140]

46. Gruenewald PJ. The spatial ecology of alcohol problems: niche theory and assortative drinking. Addiction. Jun 2007;102(6):870–8. doi:10.1111/j.1360-0443.2007.01856.x [PubMed: 17523980]

47. Freisthler B, Gruenewald PJ. Examining the relationship between the physical availability of medical marijuana and marijuana use across fifty California cities. Drug Alcohol Depend. Oct 1 2014;143:244–50. doi:10.1016/j.drugalcdep.2014.07.036 [PubMed: 25156224]

48. Barry RA, Glantz SA. Marijuana Regulatory Frameworks in Four US States: An Analysis Against a Public Health Standard. Am J Public Health. Jul 2018;108(7):914–923. doi:10.2105/AJPH.2018.304401 [PubMed: 29874509]

49. Wang V, McKinley J. Marijuana Legalization Isn't Dead Yet in New York. The New York Times. 2019;

50. Somerset SB. New York Cannabis Legalization Urgently Needs Support. Forbes. 2019

51. Hudock C Potential Additional Annual Revenues From States Currently Debating New Cannabis Laws. New Frontier Data. 2019;

52. Macnamara A These states now have legal weed, and which states could follow suit in 2020. CBS News. https://www.cbsnews.com/news/where-is-marijuana-legal-in-2020-illinois-joins-10-other-states-legalizing-recreational-pot-2020-01-01/

53. Lancione S, Wade K, Windle SB, Filion KB, Thombs BD, Eisenberg MJ. Non-medical cannabis in North America: an overview of regulatory approaches. Public Health. Jan 2020;178:7–14. doi:10.1016/j.puhe.2019.08.018 [PubMed: 31600630]

54. Steinberg J, Unger JB, Hallett C, Williams E, Baezconde-Garbanati L, Cousineau MR. A Tobacco Control Framework for Regulating Public Consumption of Cannabis: Multistate Analysis and Policy Implications. Am J Public Health. Feb 2020;110(2):203–208. doi:10.2105/AJPH.2019.305423 [PubMed: 31855488]

55. Schauer GL. Cannabis Policy in the United States: Implications for Public Health. J Natl Cancer Inst Monogr. Nov 28 2021;2021(58):39–52. doi:10.1093/jncimonographs/lgab016 [PubMed: 34850901]

56. Duan Z, Kasson E, Rajamahanty A, et al. Assessment of online marketing and sales practices among recreational cannabis retailers in 5 US cities. Under review;

57. Berg CJ, Barker DC, Meyers C, et al. Exploring the Point-of-Sale Among Vape Shops Across the United States: Audits Integrating a Mystery Shopper Approach. Nicotine Tob Res. Feb 16 2021;23(3):495–504. doi:10.1093/ntr/ntaa041 [PubMed: 32149340]

58. Cohen J A coefficient of agreement for nominal scales. Educational and psychological measurement. 1960;20(1):37–46.

59. MacKillop J, Busse JW. Prioritizing research on cannabis use among Canadian Veterans. University of Toronto Press; 2018. p. 2–5.

60. Fiala SC, Dilley JA, Firth CL, Maher JE. Exposure to marijuana marketing after legalization of retail sales: Oregonians' experiences, 2015–2016. American journal of public health. 2018;108(1):120–127. [PubMed: 29161062]

61. Ling PM, Crosbie E, Holmes LM, Hoang C, Hoeper S. Cannabis dispensary online marketing practices in response to COVID-19 lockdowns. Substance Abuse. 2022;43(1):1116–1119. [PubMed: 35499400]

62. Britt H, Toomey TL, Dunsmuir W, Wagenaar AC. ALCOHOL SALES TO UNDERAGE YOUTH: Propensity for and Correlates of Alcohol Sales to Underage Youth. Journal of Alcohol and Drug Education. 2006:25–42.

63. Wolfson M, Toomey TL, Forster JL, Wagenaar AC, McGovern PG, Perry CL. Characteristics, policies and practices of alcohol outlets and sales to underage persons. Journal of studies on alcohol. 1996;57(6):670–674. [PubMed: 8913999]

64. Forster JL, McGovern PG, Wagenaar AC, Wolfson M, Perry CL, Anstine PS. The ability of young people to purchase alcohol without age identification in northeastern Minnesota, USA. Addiction. 1994;89(6):699–705. [PubMed: 8069171]

65. Budenz A, Moser RP, Eck R, et al. Awareness of Alcohol and Cancer Risk and the California Proposition 65 Warning Sign Updates: A Natural Experiment. International Journal of Environmental Research and Public Health. 2022;19(19):11862. [PubMed: 36231178]

66. Wolfson L, Poole N. Supportive alcohol policy as a key element of fetal alcohol spectrum disorder prevention. Women's Health. 2023;19:17455057231151838. doi:10.1177/17455057231151838

67. Coady MH, Chan CA, Auer K, Farley SM, Kilgore EA, Kansagra SM. Awareness and impact of New York City's graphic point-of-sale tobacco health warning signs. Tobacco Control. 2013;22(e1):e51–e56. doi:10.1136/tobaccocontrol-2011-050261 [PubMed: 22730446]

68. Willis LE. Performance-Based Consumer Law. The University of Chicago Law Review. 2015;82(3):1309–1409.

69. Dickson B, Mansfield C, Guiahi M, et al. Recommendations from cannabis dispensaries about first-trimester cannabis use. Obstetrics and gynecology. 2018;131(6):1031. [PubMed: 29742676]

70. Romm KF, Cavazos-Rehg P, Williams R, et al. Cannabis retailer communication about cannabis products, health benefits and risks: A mystery shopper study of retailers in 5 US cities. Under review;

71. Cash MC, Cunnane K, Fan C, Romero-Sandoval EA. Mapping cannabis potency in medical and recreational programs in the United States. PLoS One. 2020;15(3):e0230167. doi:10.1371/journal.pone.0230167 [PubMed: 32214334]

72. Wang Y, Duan Z, Weaver SR, et al. The Short-Term and Long-Term Associations Between Receiving Tobacco Discounts or Coupons and Smoking Cessation Among US Adult Cigarette Smokers With Intention to Quit. Nicotine & Tobacco Research. 2022;

73. Choi K, Chen JC, Tan AS, Soneji S, Moran MB. Receipt of tobacco direct mail/email discount coupons and trajectories of cigarette smoking behaviours in a nationally representative longitudinal cohort of US adults. Tobacco Control. 2019;28(3):282–288.

74. Liber AC, Sánchez-Romero LM, Cadham CJ, et al. Tobacco Couponing: A Systematic Review of Exposures and Effects on Tobacco Initiation and Cessation. Nicotine & Tobacco Research. 2022;

75. Raudenbush SW, Sampson RJ. 'Ecometrics': Toward A Science of Assessing Ecological Settings, with Application to the Systematic Social Observation of Neighborhoods. Sociological Methodology. 1999;29:1–41.

HIGHLIGHTS

- Cannabis retail surveillance is crucial to inform regulations and protect consumers.

- Among 150 US retailers in 2022, >90% verified age, but 20.7% had youth-oriented signs.

- Required health warnings was absent in many cities, but 28.7% posted health claims.

- Product availability, potency, and prices varied, and >75% had price promotions.

- Differing practices across cities reflected both distinct laws and enforcement gaps.

Table 1.

Characteristics of 150 cannabis retailers across 5 US cities in Summer 2022

Variable	Total N=150 N (%)	Kappa	Denver N=30 (20.0%) N (%)	Seattle N=30 (20.0%) N (%)	Portland N=30 (20.0%) N (%)	Las Vegas N=30 (20.0%) N (%)	LA N=30 (20.0%) N (%)	p
Store type, N (%)		.89						**<.001**
Recreational and medical	94 (62.7)		19 (63.3)a	1 (3.3)c	30 (100.0)b	28 (93.3)b	16 (53.3)a	
Recreational only	56 (37.3)		11 (36.7a	29 (96.7)c	0 (0)b	2 (6.7)b	14 (46.7)a	
Building type, N (%)		.94						**<.001**
Storefront on street	58 (38.7)		11 (36.7)a,b	11 (36.7)a,b	14 (46.7)a	3 (10.0)b	19 (63.3)a	
Warehouse	44 (29.3)		10 (33.3)	15 (50.0)	5 (16.7)	8 (26.7)	6 (20.0)	
House	19 (12.7)		4 (13.3)	3 (10.0)	9 (30.0)	2 (6.7)	1 (3.3)	
Office building	16 (10.7)		5 (16.7)a,b	0 (0)a	1 (3.3)a,b	9 (30.0)b	1 (3.3)a,b	
Shopping center	13 (8.7)		0 (0)a	1 (3.3)a,b	1 (3.3)a,b	8 (26.7)b	3 (10.0)a,b	
Structural features, N (%)								
Interior security camera	149 (99.3)	--	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	29 (96.7)	.402
Exterior security camera	144 (96.0)	.79	29 (96.7)	30 (100.0)	30 (100.0)	30 (100.0)	25 (83.3)	**.003**
Waiting room	84 (56.0)	.87	26 (86.7)c,d	5 (16.7)a	17 (56.7)b,d	27 (90.0)c	9 (30.0)a,b	**<.001**
Security guard	75 (50.0)	.91	2 (6.7)b	13 (43.3)c	1 (3.3)b	30 (100.0a	29 (96.7)a	**<.001**
Seating area available	64 (42.7)	.79	24 (80.0)c	3 (10.0)a	16 (53.3)c	13 (43.3)b	8 (26.7)a,b	**<.001**
Private room/consultation with staff	18 (12.0)	.94	16 (53.3)b	0 (0)a	0 (0)a	2 (6.7)a	0 (0)a	**<.001**
Attached to consumer lounge	2 (1.3)	1	0 (0)	0 (0)	0 (0)	1 (3.3)	1 (3.3)	.551
Adjacent shop sold related paraphernalia	6 (4.0)	.91	2 (6.7)	3 (10.0)	0 (0)	1 (3.3)	0 (0)	.207
Promotional media channels, N (%)								
Exterior								
Canopy signs	38 (25.3)	.89	14 (46.7)b	20 (66.7)b	0 (0)a	1 (3.3)a	3 (10.0)a	**<.001**
Portable/temporary signs	37 (24.7)	.95	2 (6.7)b,c	10 (33.3)b	0 (0)c	4 (13.3)b,c	21 (70.0)a	**<.001**
Light up signs	19 (12.7)	.96	1 (3.3)	4 (13.3)	7 (23.3)	4 (13.3)	3 (10.0)	.226
Supergraphic signs	9 (6.0)	.94	0 (0)	1 (3.3)	5 (16.7)	1 (3.3)	2 (6.7)	.068

Variable	Total	Kappa	Denver	Seattle	Portland	Las Vegas	LA	p
	N=150		N=30	N=30	N=30	N=30	N=30	
			(20.0%)	(20.0%)	(20.0%)	(20.0%)	(20.0%)	
	N (%)		N (%)	N (%)	N (%)	N (%)	N (%)	
Digital signs	6 (4.0)	1	0 (0)	1 (3.3)	1 (3.3)	4 (13.3)	0 (0)	.052
Interior								
Stickers/decals	124 (82.7)	.82	28 (93.3)	23 (76.7)	26 (86.7)	25 (83.3)	22 (73.3)	.258
TV/other screens	107 (71.3)	.95	15 (50.0)[a]	24 (80.0)[a,b]	15 (50.0)[a]	29 (96.7)[b]	24 (80.0)[a,b]	<.001
Chalkboards/whiteboards	53 (35.3)	.88	12 (40.0)[a,b]	9 (30.0)[a]	20 (66.7)[b]	5 (16.7)[a]	7 (23.3)[a]	<.001
Functional items	34 (22.7)	.98	6 (20.0)[a,b]	13 (43.3)[a]	8 (26.7)[a]	0 (0)[b]	7 (23.3)[a]	.002
Light up signs	32 (21.3)	.92	12 (40.0)[a]	5 (16.7)[a,b]	0 (0)[b]	8 (26.7)[a]	7 (23.3)[a]	.004
Forms of payment accepted, N (%)								
ATM on site	147 (98.0)	1	28 (93.3)	30 (100.0)	30 (100.0)	30 (100.0)	29 (96.7)	.245
Cash	133 (88.7)	.63	30 (100.0)[b]	23 (76.7)[a]	30 (100.0)[b]	29 (96.7)[a,b]	21 (70.0)[a]	<.001
Debit card	64 (42.7)	.99	25 (83.3)[b]	7 (23.3)[a]	8 (26.7)[a]	12 (40.0)[a]	12 (40.0)[a]	<.001
Credit card	14 (9.3)	.96	1 (3.3)[a,b]	2 (6.7)[a,b]	0 (0)[b]	2 (6.7)[a,b]	9 (30.0)[a]	<.001

Notes: Kappas are for initial inter-rater reliability among pairs of point-of-sale auditors. Superscript letters indicate significant differences in post-hoc analyses.

Table 2.

Regulatory compliance and regulation-related signage at 150 cannabis retailers across 5 US cities in Summer 2022

Variable	Total N (%)	Kappa	Denver N (%)	Seattle N (%)	Portland N (%)	Las Vegas N (%)	LA N (%)	p
Mystery Shopper Data	**N=140**	--	**N=30** (21.4%)	**N=30** (21.4%)	**N=30** (21.4%)	**N=20** (14.3%)	**N=30** (21.4%)	
Within 2 blocks, N (%)								
Schools	20 (14.3)		0 (0)a	0 (0)a	2 (6.7)a	2 (10.0)a	16 (53.3)b	<.001
Parks/playgrounds	11 (7.9)		0 (0)a	1 (3.3)a	1 (3.3)a	1 (5.0)a	8 (26.7)b	<.001
Other youth-oriented establishments	8 (5.7)		3 (10.0)	1 (3.3)	0 (0)	2 (10.0)	2 (6.7)	.421
Public transit	20 (14.3)		4 (13.3)	8 (26.7)	5 (16.7)	1 (5.0)	2 (6.7)	.150
Medical clinic	14 (10.0)		0 (0)a	0 (0)a	0 (0)a	4 (20.0)a,b	10 (33.3)b	<.001
Bar/pub/club	42 (30.0)		10 (33.3)a	11 (36.7)a	6 (20.0)a,b	12 (60.0)b	3 (10.0)a,b	.002
Liquor store	16 (11.4)		12 (40.0)a	2 (6.7)b	0 (0)b	1 (3.3)b	1 (5.0)b	<.001
Casinos	6 (4.3)		0 (0)a	0 (0)a	0 (0)a	6 (30.0)b	0 (0)a	<.001
Other cannabis retailer	10 (7.1)		4 (13.3)	5 (16.7)	0 (0)	1 (5.0)	0 (0)	.032
Asked to provide ID, N (%)		--						<.001
No	9 (6.5)		0 (0)a	1 (3.3)a	8 (27.6)b	0 (0)a	0 (0)a	
Yes, immediately upon entry	125 (89.9)		29 (96.7)a	28 (93.3)a	18 (62.1)b	20 (100.0)a	30 (100.0)a	
Yes, but not immediately upon entry	5 (2.9)		1 (3.3)	1 (3.3)	3 (10.3)	0 (0)	0 (0)	
POS Audit Data	**N=150**		**N=30** (20.0%)	**N=30** (20.0%)	**N=30** (20.0%)	**N=30** (20.0%)	**N=30** (20.0%)	
Asked to provide ID, N (%)		.96						.020
No	7 (4.7)		0 (0)	1 (3.3)	5 (16.7)	0 (0)	1 (3.3)	
Yes, immediately upon entry	137 (91.3)		30 (100.0)a,b	27 (90.0)a,b	24 (80.0)a	30 (100.0)b	29 (96.7)a,b	
Yes, but not immediately upon entry	3 (2.0)		0 (0)	2 (6.7)	1 (3.3)	0 (0)	0 (0)	
Onsite use and intoxication, N (%)								
Cannabis use inside the store	1 (0.7)	0	0 (0)	0 (0)	0 (0)	0 (0)	1 (3.3)	.388
Cannabis use outside the store	6 (4.0)	.66	1 (3.3)	1 (3.3)	0 (0)	2 (6.7)	2 (6.7)	.657

Variable	Total N (%)	Kappa	Denver N (%)	Seattle N (%)	Portland N (%)	Las Vegas N (%)	LA N (%)	p
Anyone seemingly intoxicated inside the store	7 (4.7)	.92	1 (3.3)	4 (13.3)	0 (0)	0 (0)	2 (6.7)	.078
Regulation-related signage, N (%) *								
Retail license posted	131 (87.3)	.90	24 (80.0)[a,b]	22 (73.3)[a]	30 (100.0)[a,b]	27 (90.0)[a,b]	28 (93.3)[a,b]	**.015**
Restricted access - no minors allowed	131 (87.3)	.90	30 (100.0)[a]	29 (96.7)[a]	29 (96.7)[a]	29 (96.7)[a]	14 (46.7)[b]	**<.001**
No onsite consumption	110 (73.3)	.93	8 (26.7)[a]	28 (93.3)[b]	24 (80.0)[b]	28 (93.3)[b]	22 (73.3)[b]	**<.001**
No distribution to minors	80 (53.3)	.84	2 (6.7)[a]	28 (93.3)[b]	20 (66.7)[b]	21 (70.0)[b]	9 (30.0)[a]	**<.001**
Security cameras in use	73 (48.7)	.96	8 (26.7)[a]	16 (53.3)[a,b]	17 (56.7)[a,b]	22 (73.3)[b]	10 (33.3)[a]	**.002**
Limits on purchase amount	47 (31.3)	.98	3 (10.0)[a]	2 (6.7)[a]	15 (50.0)[b]	26 (86.7)[c]	1 (3.3)[a]	**<.001**
Transport across state lines prohibited	38 (25.3)	.98	3 (10.0)[a]	0 (0)[a]	13 (43.3)[b]	22 (73.3)[b]	0 (0)[a]	**<.001**
Right to refuse service to those intoxicated	34 (22.7)	.86	3 (10.0)	4 (13.3)	10 (33.3)	10 (33.3)	7 (23.3)	.087
Cannabis health warning signage, N (%) *^								
Pregnancy/breastfeeding	108 (72.0)	1.00	20 (66.7)[a]	29 (96.7)[b]	26 (86.7)[b]	13 (43.3)[a]	20 (66.7)[a]	**<.001**
Harm to health	57 (38.0)	.98	1 (3.3)[a]	28 (93.3)[b]	1 (3.3)[a]	6 (20.0)[a]	21 (70.0)[b]	**<.001**
Negative impacts on children/youth	28 (18.7)	.43	0 (0)[a]	1 (3.3)[a]	1 (3.3)[a]	10 (33.3)[b]	16 (53.3)[b]	**<.001**
DUI	21 (14.0)	.97	9 (30.0)[a]	9 (30.0)[a]	0 (0)[b]	3 (10.0)[a,b]	0 (0)[b]	**<.001**
Child access	8 (5.3)	1.00	0 (0)[a]	0 (0)[a]	1 (3.3)[a,b]	7 (23.3)[b]	0 (0)[a]	**<.001**
Addiction	6 (4.0)	1.00	0 (0)	6 (20.0)	0 (0)	0 (0)	0 (0)	**<.001**
Other physical or mental health	5 (3.3)	.91	2 (6.7)	0 (0)	2 (6.7)	1 (3.3)	0 (0)	.388
Amount of THC cautions	5 (3.3)	.79	0 (0)	0 (0)	0 (0)	4 (13.3)	1 (3.3)	**.015**
Overconsumption	5 (3.3)	1.00	1 (3.3)	0 (0)	0 (0)	3 (10.0)	1 (3.3)	.184
Serving size cautions	4 (2.7)	1.00	0 (0)	1 (3.3)	0 (0)	3 (10.0)	0 (0)	.068
Negative interactions with alcohol/drugs	1 (0.7)	1.00	0 (0)	0 (0)	0 (0)	1 (3.3)	0 (0)	.402
Nature of regulation-related signage, N (%) *#								
Difficult to see because of location	31 (20.7)		1 (3.3)[a]	4 (13.3)[a,b]	3 (10.0)[a,b]	13 (43.3)[c]	10 (33.3)[c]	**<.001**
Difficult to see; covered by other signs/materials	3 (2.0)		2 (6.7)	0 (0)	0 (0)	1 (3.3)	0 (0)	.245
Other (tiny font; printed onto glass door)	10 (6.7)		1 (2.2)	3 (10.0)	0 (0)	4 (13.3)	2 (6.7)	.253

Notes: Kappas are for initial inter-rater reliability among pairs of point-of-sale auditors. Superscript letters indicate significant differences in post-hoc analyses.

* Interior or exterior.

^
None referenced poisoning.

#
None damaged, torn, etc.

Table 3.

Cannabis advertising and promotion among 150 cannabis retailers across 5 US cities in Summer 2022

Variable	Total N=150 N (%)	Kappa	Denver N=30 (20.0%) N (%)	Seattle N=30 (20.0%) N (%)	Portland N=30 (20.0%) N (%)	Las Vegas N=30 (20.0%) N (%)	LA N=30 (20.0%) N (%)	p
Signage with cannabis health claims, N (%) [*]	43 (28.7)	.88	10 (33.3)	7 (16.3)	9 (30.0)	8 (26.7)	9 (30.0)	.932
Youth-oriented signage, N (%) [*§]	**31 (20.7)**	.83	**13 (43.3)**[a]	**6 (20.0)**[a,b]	**6 (20.0)**[a,b]	**3 (10.0)**[b]	**3 (10.0)**[b]	**.009**
Youth-oriented product packaging, N (%) [§]	27 (18.0)	.89	**16 (53.3)**[b]	**3 (10.0)**[a,c,d,e]	**0 (0)**[c,e]	**2 (6.7)**[d,e]	**6 (20.0)**[a,b,c,d,e]	**<.001**
Signage targeting special populations, N (%)								
LGBTQ+	16 (10.7)	.92	4 (13.3)	7 (23.3)	1 (3.3)	1 (3.3)	3 (10.0)	.070
Teens/young adults	14 (9.3)	.84	**9 (30.0)**[a]	**2 (6.7)**[a,b]	**0 (0)**[b]	**2 (6.7)**[a,b]	**1 (3.3)**[a,b]	**<.001**
Racial/ethnic minority	6 (4.0)	.76	0 (0)	2 (6.7)	3 (10.0)	1 (3.3)	0 (0)	.207
Veterans	4 (2.7)	.74	1 (3.3)	2 (6.7)	0 (0)	1 (3.3)	0 (0)	.463
Seniors	4 (2.7)	.85	1 (3.3)	2 (6.7)	0 (0)	1 (3.3)	0 (0)	.463
Pregnant/postpartum women	1 (0.7)	1	0 (0)	1 (3.3)	0 (0)	0 (0)	0 (0)	.402
Other [#]	9 (6.0)	.76	1 (3.3)	0 (0)	1 (3.3)	3 (10.0)	4 (13.3)	.172
Ad content, N (%) [*^&]								
Pop culture references	23 (15.3)	.84	6 (20.0)	3 (10.0)	8 (26.7)	3 (10.0)	3 (10.0)	.245
Emphasizing research or science	22 (14.7)	.84	**5 (16.7)**[a,b]	**10 (33.3)**[a]	**3 (10.0)**[a,b]	**3 (10.0)**[a,b]	**1 (3.3)**[b]	**.014**
Showing actual use	13 (8.7)	.92	5 (16.7)	3 (10.0)	0 (0)	3 (10.0)	2 (6.7)	.235
Celebrity endorsements	11 (7.3)	.78	1 (3.3)	3 (10.0)	0 (0)	4 (13.3)	3 (10.0)	.258
Promoting free products/giveaways	8 (5.3)	.65	2 (6.7)	0 (0)	1 (3.3)	3 (10.0)	2 (6.7)	.488
Promoting intoxication	4 (2.7)	.85	0 (0)	1 (3.3)	0 (0)	3 (10.0)	3 (10.0)	.068
Targeting out of state customers	3 (2.0)	.66	1 (3.3)	0 (0)	1 (3.3)	1 (3.3)	0 (0)	.728
References to school	3 (2.0)	1.00	1 (3.3)	0 (0)	0 (0)	1 (3.3)	1 (3.3)	.728
Any exterior price promotions, N (%) [£]	17 (11.3)	.75	**1 (3.3)**[a]	**1 (3.3)**[a]	**0 (0)**[a]	**5 (16.7)**[a,b]	**10 (33.3)**[b]	**<.001**
Interior cannabis price promotions, N (%) [£]								
Price specials	113 (75.3)	.83	22 (73.3)	23 (76.7)	23 (76.7)	20 (66.7)	25 (83.3)	.668
Daily/weekly/month specials	100 (66.7)	.92	21 (70.0)	23 (76.7)	23 (76.7)	19 (63.3)	14 (46.7)	.078

Variable	Total N=150	Kappa	Denver N=30 (20.0%)	Seattle N=30 (20.0%)	Portland N=30 (20.0%)	Las Vegas N=30 (20.0%)	LA N=30 (20.0%)	p
	N (%)		N (%)	N (%)	N (%)	N (%)	N (%)	
Membership programs	59 (39.3)	.91	18 (60.0)[a]	8 (26.7)[a,b]	7 (23.3)[b]	17 (56.7)[a,b]	9 (30.0)[a,b]	**.004**
Almost free products	23 (15.3)	.73	10 (33.3)[a]	0 (0)[b,c]	0 (0)[c]	6 (20.0)[a,b,c]	7 (23.3)[a]	**<.001**
Drawings or raffles	20 (13.3)	.89	3 (10.0)[a,b]	1 (3.3)[a]	2 (6.7)[a,b]	10 (33.3)[b]	4 (13.3)[a,b]	**.006**
Happy hour specials	19 (12.7)	.93	3 (10.0)	2 (6.7)	6 (20.0)	4 (13.3)	4 (13.3)	.618
Free product	12 (8.0)	.83	3 (10.0)	0 (0)	2 (6.7)	3 (10.0)	4 (13.3)	.384
Incentives/discounts for review on social media	12 (8.0)	.96	6 (20.0)	0 (0)	4 (13.3)	2 (6.7)	0 (0)	**.015**
Discounts for first-time customers	12 (8.0)	.89	4 (13.3)	0 (0)	2 (6.7)	5 (16.7)	1 (3.3)	.100
Discounts for military/veterans	12 (8.0)	.89	1 (3.3)[a,b]	2 (6.7)[a,b]	0 (0)[a]	7 (23.3)[b]	2 (6.7)[a,b]	**.010**
Product of day/week/month	9 (6.0)	.71	4 (13.3)	2 (6.7)	0 (0)	1 (3.3)	2 (6.7)	.267
Bargain bins	6 (4.0)	1	1 (3.3)	1 (3.3)	4 (13.3)	0 (0)	0 (0)	.052
Early bird specials	5 (3.3)	.89	1 (3.3)	1 (3.3)	2 (6.7)	0 (0)	1 (3.3)	.723
Discounts for college students	5 (3.3)	1	1 (3.3)	0 (0)	0 (0)	3 (10.0)	1 (3.3)	.184
Other ¥	29 (19.3)	.88	9 (30.0)[a,b]	1 (3.3)[b]	1 (3.3)[b]	4 (13.3)[b]	14 (46.7)[a]	**<.001**
Signs/promotions for ordering/delivery, N (%)								
Curbside delivery or pick up	42 (28.0)	.98	2 (6.7)[a]	10 (33.3)[a,b]	7 (23.3)[a,b]	17 (56.7)[b]	6 (20.0)[a]	**<.001**
Online ordering	38 (25.3)	.95	13 (43.3)[b,c]	17 (56.7)[c]	5 (16.7)[a,b]	1 (3.3)[a]	2 (6.7)[a]	**<.001**
Home delivery	20 (13.4)	.96	3 (10.0)[a,b]	0 (0)[a]	2 (6.7)[a,b]	10 (33.3)[b]	5 (16.7)[a,b]	**.001**
Drive through	2 (1.3)	1	1 (3.3)	0 (0)	0 (0)	3 (10.0)	0 (0)	.068
Other signs/promotions, N (%)								
Website or social media for own product line	97 (64.7)	.90	17 (56.7)[a]	1 (3.3)[c]	26 (86.7)[a,b]	28 (93.3)[b]	25 (83.3)[a,b]	**<.001**
Website or social media for other brand	26 (17.3)	.69	4 (13.3)[a,b]	0 (0)[a]	10 (33.3)[b]	6 (20.0)[a,b]	6 (20.0)[a,b]	**.015**
Information about how to get medical card	15 (10.0)	1	10 (33.3)[b]	0 (0)[a]	0 (0)[a]	4 (13.3)[a,b]	1 (3.3)[a]	**<.001**
Indicates store's sponsorship of local events	10 (6.7)	.73	1 (3.3)	2 (6.7)	0 (0)	3 (10.0)	4 (13.3)	.253
Information about medical/mental resources	9 (6.0)	.87	9 (30.0)[b]	0 (0)[a]	0 (0)[a]	0 (0)[a]	0 (0)[a]	**<.001**
Promotes who owns store	7 (4.7)	.89	0 (0)	1 (3.3)	1 (3.3)	2 (6.7)	3 (10.0)	.420
Posted requirements of medical card needed	4 (2.7)	1	3 (10.0)	0 (0)	0 (0)	1 (3.3)	0 (0)	.068
Take-away materials, N (%)								

Variable	Total N=150 N (%)	Kappa	Denver N=30 (20.0%) N (%)	Seattle N=30 (20.0%) N (%)	Portland N=30 (20.0%) N (%)	Las Vegas N=30 (20.0%) N (%)	LA N=30 (20.0%) N (%)	p
Product menus	79 (52.7)	.93	1 (3.3)[b]	5 (16.7)[b]	27 (90.0)[a]	25 (83.3)[a]	21 (70.0)[a]	<.001
Product flyers	57 (38.0)	.83	4 (13.3)[c]	3 (10.0)[c]	22 (73.3)[a]	11 (36.7)[b,c]	17 (56.7)[a,b]	<.001
Brand flyers	57 (38.0)	.87	15 (50.0)[a]	12 (40.0)[a]	0 (0)[b]	11 (36.7)[a]	19 (63.3)[a]	<.001
Magazines	52 (34.7)	.95	15 (50.0)[b,c]	14 (46.7)[b,c]	17 (56.7)[c]	6 (20.0)[a,b]	0 (0)[a]	<.001
Retailer flyers	40 (26.7)	.83	0 (0)[c]	0 (0)[c]	23 (76.7)[b]	10 (33.3)[a]	7 (23.3)[a]	<.001
Flyers for events	17 (11.3)	.81	4 (13.3)	6 (20.0)	0 (0)	1 (3.3)	6 (20.0)	.035
Information about medical/mental resources	14 (9.3)	.96	14 (46.7)[b]	0 (0)[a]	0 (0)[a]	0 (0)[a]	0 (0)[a]	<.001
Information about how to get medical card	13 (8.7)	.96	10 (33.3)[b]	0 (0)[a]	0 (0)[a]	2 (6.7)[a,b]	1 (3.3)[a]	<.001

Notes: Kappa are for initial inter-rater reliability among pairs of point-of-sale auditors. Superscript letters indicate significant differences in post-hoc analyses.

*
Interior or exterior.

§Instructions: Examples might include images of minors (i.e., looking to be under 21), cartoons, toys, candy, brands (e.g., of non-cannabis products) or similar images and items typically marketed towards minors, likeness to characters (e.g., movie, cartoon, action figures, mascots, balloons/inflatables) popularly used to advertise to children, symbols or celebrities that are commonly used to market products to minors, or flavors (e.g., fruit) popular with minors.

#Other included: athletes, frontline workers, industry workers, women, etc.

^None compared the safety of cannabis to alcohol, tobacco, or other drugs.

&Ads defined as: 8.5 × 11 inches or larger; branded with intent to sell product; either professionally-made and/or amateur (hand-written); and not limited to signage. "Any price promotions" recorded for outdoor only; assessments for indoor promotions detailed as noted.

£Price promotions defined as: Any discounts on products.

¥Other included: summertime discounts; backpack filled with flower 25% off; birthday discount; discount cards; discount for medical card holders; discount for sports jersey; discounts for women on Mondays; refer a friend; show hotel key and get discount; social security disability discount; Wednesdays 10% off online orders, etc.

Table 4.

Cannabis products and prices at 150 cannabis retailers across 5 US cities in Summer 2022

Variable	Total N=150 (20.0%) N (%)	Kappa	Denver N=30 (20.0%) N (%)	Seattle N=30 (20.0%) N (%)	Portland N=30 (20.0%) N (%)	Las Vegas N=30 (20.0%) N (%)	LA N=30 (20.0%) N (%)	p
Cannabis products available, N (%)								
Bud/flower, joints, e-liquids, edibles, oils	150 (100.0)	--	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	--
Hash	149 (99.3)	1	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	29 (96.7)	.402
Topicals	142 (94.7)	.94	26 (86.7)	30 (100.0)	30 (100.0)	30 (100.0)	26 (86.7)	**.013**
Beverages	137 (91.3)	.81	28 (93.3)	30 (100.0)	25 (83.3)	24 (80.0)	30 (100.0)	**.011**
Tinctures	107 (71.3)	.95	20 (66.7)[b]	30 (100.0)[a,c]	0 (0)[d]	30 (100.0)[c]	27 (90.0)[a,b,c]	**<.001**
Clones	7 (4.7)	1	0 (0)	0 (0)	5 (16.7)	0 (0)	2 (6.7)	**.006**
Seeds	6 (4.0)	1	2 (6.7)	0 (0)	1 (3.3)	0 (0)	3 (10.0)	.207
Other	4 (2.7)	1	2 (6.7)	2 (6.7)	0 (0)	0 (0)	0 (0)	.187
Most potent cannabis product sold, N (%) *								
E-liquids	57 (38.0)	.98	0 (0)[b]	12 (40.0)[a,c]	27 (90.0)[d]	12 (40.0)[c]	6 (20.0)[a,b,c]	**<.001**
Oils	37 (24.7)	.98	8 (26.7)[a,b,c]	12 (40.0)[a,c]	1 (3.3)[b]	11 (36.7)[c]	5 (16.7)[a,b,c]	**.006**
Hash	25 (16.7)	.98	18 (60.0)[b]	4 (13.3)[a]	2 (6.7)[a]	0 (0)[a]	1 (3.3)[a]	**<.001**
Tinctures	20 (13.3)	.93	1 (3.3)[b]	1 (3.3)[b]	0 (0)[b]	4 (13.3)[b]	14 (46.7)[a]	**<.001**
Bud/flower	9 (6.0)	1	1 (3.3)	0 (0)	0 (0)	3 (10.0)	5 (16.7)	**.025**
Joints	6 (4.0)	.33	0 (0)	0 (0)	4 (13.3)	1 (3.3)	1 (3.3)	.052
Least potent cannabis product sold, N (%) *								
Edibles	80 (53.3)	.96	15 (50.0)[a]	27 (90.0)[b]	0 (0)[c]	24 (80.0)[a,b]	14 (46.7)[a]	**<.001**
Joints	16 (10.7)	.93	5 (16.7)[a,b]	1 (3.3)[a,b]	0 (0)[b]	2 (6.7)[a,b]	8 (26.7)[a]	**.005**
Beverages	13 (8.7)	1	0 (0)[a]	2 (6.7)[a,b]	1 (3.3)[a,b]	7 (23.3)[b]	3 (10.0)[a,b]	**.015**
Bud/flower	11 (7.3)	1	10 (33.3)[b]	0 (0)[a]	0 (0)[a]	0 (0)[a]	1 (3.3)[a]	**<.001**
Most expensive cannabis product sold, N (%) ^								
Bud/flower	87 (58.0)	1	15 (50.0)[a]	25 (83.3)[a,b]	0 (0)[c]	28 (93.3)[b]	19 (63.3)[a]	**<.001**
Hash	10 (6.7)	1	6 (20.0)	1 (3.3)	0 (0)	0 (0)	3 (10.0)	**.008**

Variable	Total N=150 N (%)	Kappa	Denver N=30 (20.0%) N (%)	Seattle N=30 (20.0%) N (%)	Portland N=30 (20.0%) N (%)	Las Vegas N=30 (20.0%) N (%)	LA N=30 (20.0%) N (%)	p
Tinctures	7 (4.7)	.93	0 (0)	1 (3.3)	1 (3.3)	0 (0)	5 (16.7)	.012
E-liquids	6 (4.0)	1	3 (10.0)	1 (3.3)	0 (0)	1 (3.3)	1 (3.3)	.384
Topicals	4 (2.7)	1	3 (10.0)	1 (3.3)	0 (0)	0 (0)	0 (0)	.068
Oils	4 (2.7)	1	0 (0)	3 (10.0)	0 (0)	1 (3.3)	0 (0)	.068
Least expensive cannabis product sold, N (%)[^]								
Joints	81 (54.0)	1	21 (70.0)[a]	21 (70.0)[a]	0 (0)[b]	17 (56.7)[a]	22 (73.3)[a]	<.001
Edibles	35 (23.3)	.98	7 (23.3)	9 (30.0)	5 (16.7)	6 (20.0)	8 (26.7)	.761
Bud/flower	19 (12.7)	.97	4 (13.3)[a,b]	2 (6.7)[a]	11 (36.7)[b]	0 (0)[a]	2 (6.7)[a]	<.001
Beverages	15 (10.0)	1	2 (6.7)[a,b]	1 (3.3)[a,b]	0 (0)[a]	9 (30.0)[b]	3 (10.0)[a,b]	<.001
Paraphernalia, apparel, etc. sold, N (%)[¥]								
Vaporizers	139 (92.7)	.94	26 (86.7)	30 (100.0)	29 (96.7)	28 (93.3)	26 (86.7)	.179
Wrapping papers	138 (92.0)	1	25 (83.3)[a,b]	30 (100.0)[b]	30 (100.0)[b]	30 (100.0)[b]	23 (76.7)[a]	<.001
Hookah pipes/waterpipes/bongs	122 (81.3)	1	25 (83.3)[a,b]	27 (90.0)[b]	28 (93.3)[b]	27 (90.0)[b]	15 (50.0)[a]	<.001
Apparel	93 (62.0)	.94	25 (83.3)[a]	1 (3.3)[b]	25 (83.3)[a]	24 (80.0)[a]	18 (60.0)[a]	<.001
Other glassware	84 (56.0)	.90	26 (86.7)[c]	9 (30.0)[a,b]	24 (80.0)[c]	18 (60.0)[b,c]	7 (23.3)[a]	<.001

Notes: Kappas are for initial inter-rater reliability among pairs of point-of-sale auditors. Superscript letters indicate significant differences in post-hoc analyses.

[*] Other most potent: edibles n=2, beverages n=1, other n=9. Other least potent: e-liquids n=1, tinctures n=1, other n=1.

[^] Other most expensive product: joints n=1, edibles n=1, other n=4. Other least expensive: oils n=2, tinctures n=2, topicals n=1.

[¥] Other paraphernalia, apparel, etc.: art, candy machine, chocolates, dog toys, eye drops, greeting cards, hats, journals, immunity boost drinks, candy, snacks.