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## Point-of-Sale Marketing in Recreational Marijuana Dispensaries Around California Schools

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### A B S T R A C T

**Purpose:** After marijuana commercialization, the presence of recreational marijuana dispensaries (RMDs) was rapidly increasing. The point-of-sale marketing poses concerns about children's exposure. This study examined advertising and promotions that potentially appeal to children and access restrictions in RMDs around California schools.

**Methods:** This was a cross-sectional and observational study conducted from June to September 2018. Trained fieldworkers audited retail environments in 163 RMDs in closest proximity to 333 randomly sampled public schools in California.

**Results:** About 44% of schools had RMDs located within 3 miles. Regarding interior marketing, 74% of RMDs had at least one instance of child-appealing products, packages, paraphernalia, or advertisements. RMDs closer to a school had a higher proportion with interior child-appealing marketing. More than three fourths of RMDs had generic promotional activities; particularly, 28% violated the free-sample ban. Regarding exterior marketing, only 2% of RMDs had those appealing to children. More than 60% of RMDs had exterior signs indicative of marijuana. Approximately, one-third had generic advertisements, and 13% had advertisements bigger than 1,600 square inches. Regarding access restrictions, almost all RMDs complied with age verification, but 84% had no age limit signs, and only 40% had security personnel.

**Conclusions:** Despite minimal point-of-sale marketing practices appealing to children on the exterior of RMDs around California schools, such practices were abundant on the interior. Marketing practices not specifically appealing to children were also common on both the interior and exterior of RMDs. Dispensaries' violation of age verification law, lack of security personnel, and presence of child-appealing marketing should be continuously monitored and prevented.

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### IMPLICATIONS AND CONTRIBUTION

Children are at risk of being exposed to marijuana marketing after marijuana is commercialized. This study found abundant marketing practices appealing to children inside of marijuana dispensaries and general marketing practices outside of dispensaries around schools. Dispensaries' violation of age verification and presence of child-appealing marketing should be continuously monitored.

**Conflicts of interest:** The authors have no conflicts of interest to disclose.

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Recreational marijuana commercialization is gaining momentum in the U.S. Among the 11 states and Washington DC that have legalized recreational marijuana since 2012, retail markets have been opened or anticipated in 10 states, where more than one-quarter of the U.S. population live. The presence of recreational marijuana dispensaries (RMDs) increased rapidly following the commercialization [1]. Children are at a high risk of initiating marijuana use and developing adverse consequences related to marijuana [2]. The rapidly evolving environment poses

considerable concerns about children's exposure to marijuana and related marketing and creates significant challenges for pediatricians preventing, treating, and educating about marijuana-related harms among children [3].

As stated in its most recent policy statement about marijuana commercialization, the American Academy of Pediatrics "strongly recommends strict enforcement of rules and regulations that limit access and marketing and advertising to youth" [3]. The presence of RMDs in neighborhoods and point-of-sale marketing such as advertising and promotional activities in RMDs might increase the visibility and awareness of marijuana products among children, whose perceptions and behaviors may be influenced. A study in Oregon found that dispensary storefront was the most common source of advertising seen after commercialization [4]. Self-reported exposure to medical marijuana advertising was found to be related to higher levels of use and intentions of future use among children in California schools [5]. Products, packages, and advertisements that are designed to be appealing to children are particularly concerning. Tobacco and alcohol literature repeatedly suggested that children are common targets of marketing [6–10]. Despite the fact that all the states with marijuana commercialization have some form of prohibitions on child-appealing products and marketing, it remains undocumented as to what extent the marijuana industry is complying.

This study is the first to comprehensively assess point-of-sale marketing practices in RMDs with a focus on those relevant to children. Unlike previous marijuana research relying on individual self-reported exposure measures [4,5], we adopted the direct and objective observation approach that has been commonly used in tobacco and alcohol studies on retail outlets [11–14]. We audited RMDs near a representative and large sample of schools in California, the largest legal retail market in the U.S. where more than 10 million children can be potentially influenced. We identified product and packaging characteristics, advertising and promotional activities, and access restrictions in these dispensaries.

## Methods

### Study design and sample

This was a cross-sectional and observational study conducted from June to September 2018. We obtained a list of public schools in California that participated in the 2017–2018 California Student Tobacco Survey (CSTS). The CSTS schools were drawn using a two-stage stratified random sampling approach. California was first stratified into 22 regions. Schools within each region were then randomly selected, proportional to the number of students enrolled within the region. A total of 623 schools across California were sampled and invited, with 403 schools agreeing to participate. Among these 403 schools, 44 schools opted out before the survey was conducted, and 26 schools participated in the survey but were excluded from CSTS data because of low response rate. The final effective school sample size was 333, among which 256 were high schools, and 77 were middle schools. The total number of students participating in the survey was 151,404, making it the largest school-based surveys in California. Our study focused on RMDs near these 333 schools.

### Study procedures

Six trained field workers audited retail environments in RMDs in closest proximity to the 333 schools (auditing procedures

depicted in [Figure A1](#)). We first identified dispensaries using crowdsourced online websites, including Weedmaps, Wheresweed, Leafly, and Yelp. State licensing records were not used because they could not provide a complete list of dispensaries at the time of data collection. Specifically, (1) Marijuana commercialization in California took effect in January 2018. During the study period, California was in a transition stage when annual licenses were just issued, and most were not approved; (2) The licensing policy in California was not enforced, with a large portion of dispensaries operating without licenses; and (3) For licensed dispensaries, the registered and actual business name and address often mismatched. Alternatively, we used crowdsourced databases, which were considered as reliable, up-to-date, and comprehensive sources of dispensary directories [15]. To identify the dispensary closest to a school, field workers entered school zip code (or city) in the online searchable databases. The street addresses of all the dispensaries with the school zip code (or city) were geocoded and mapped in ArcGIS (ESRI, Redlands, CA) to compute their distances to the school. Field workers then called the dispensary with the shortest distance to verify its address and operational status. These procedures were repeated if a dispensary was permanently closed or not verifiable via multiple calls until an active dispensary was identified.

The primary focus was RMDs. Yet, medical marijuana dispensaries (MMDs) that require a doctors' recommendation or state patient ID cards coexisted in California in 2018 [16]. During call verifications, if dispensary staff indicated that a doctors' recommendation or a patient ID was required to enter the dispensary and make purchase, the dispensary was categorized as an MMD. (If a doctor's recommendation or a patient ID was not required to enter the dispensary, but customers with a doctor's recommendation or a patient ID were eligible for reduced tax rates, the dispensary was considered to sell products to both adults and patients and categorized as RMD in this study.) Fieldworkers also verified dispensary classification during the subsequent auditing. For those verified as MMDs, we repeated the aforementioned procedures until an active RMD was identified.

The six trained workers in teams of two audited verified RMDs. (As depicted in [Figure A1](#), we also audited exterior environments of MMDs if they were the dispensaries closest to a school. A total of 59 schools had this situation. These data on MMDs are not reported in this study but available upon request.) On average, each RMD visit took 10–15 minutes. The 103 RMDs had unique RMD school pairs, and the 60 RMDs were the closest ones to two or more schools of the remaining 230 schools. In the main analysis, we reported observations in the unique RMDs ( $N = 163$ ). In the secondary analysis, we reported observations on RMDs using school as the unit of analysis (school  $N = 333$ ). The 60 RMDs shared by two or more schools were counted multiple times or overweighted in the secondary analysis, reflecting their potential to influence children in multiple schools.

The Human Research Protections Program at the University of California, San Diego, deemed this research nonhuman subject and required no review.

### Measurements

We developed a Web/smartphone-based surveillance tool for RMD auditing. This "Standardized Marijuana Dispensary Assessment—Children Focused (SMDA-CF)" was adapted from the validated Standardized Tobacco Assessment for Retail

Settings—Vape Shops [13] and Marijuana Retail Surveillance Tool [17], with a particular focus on child-relevant marketing practices. The tool was also informed by California's *Medicinal and Adult-Use Cannabis Regulation and Safety Act* [18].

We validated SMDA-CF through a pilot test on 18 RMDs in California. To calculate interrater reliability, two workers in a team independently audited the same dispensaries. Reliability analysis indicated moderate to high reliability for SMDA-CF as a whole (median kappa score for all items = .8, ranging from .1 to 1; Table A1). Because of the concerns about some low-reliability items, in the formal fieldwork of auditing 163 RMDs, the two workers in a team audited dispensaries together and discussed to resolve discrepancies before submitting observations.

Primarily based on SMDA-CF, the following measures were developed. Interior and exterior items were distinguished when applicable.

*School and neighborhood characteristics.* Data on school-level characteristics were extracted from the 2015–2016 Common Core of Data provided by the National Center for Educational Statistics. Data on census tract characteristics were extracted from the 2012–2016 American Community Survey 5-year estimates.

*Proximity of dispensaries.* The dispensary-to-school distance was calculated using the “As the Crow Flies” method, the shortest route between two points on the surface of the earth. In California, RMDs are required to be located at least 600 feet away from K-12 schools. We also reported network distance by mode of transportation (walking, cycling, and driving).

*Products and advertisements appealing to children.* California bans products and marketing “attractive to children,” “designed to be appealing to children or easily confused with commercially sold candy or foods,” or “in a manner to encourage persons under 21 years of age to consume.” [18]. Because these regulatory texts are rather vague, the definition and operationalization of what child appealing is in this study were primarily informed by specific details in laws from other states, particularly Nevada and Washington (Table A2). Specifically, we defined child-appealing products, packages, paraphernalia, and advertisements as those characterized by promotional characters (e.g., cartoons, animals, toys, or children), shaped like commercially sold products usually consumed by children (e.g., gummy bears, lollipop, fruits), or using bright colors (in products, mostly edibles) or bubble-like fonts (on packages, branding, advertisements, or signage; Technical Note A1). We examined the overall availability as well as the availability by dispensary-to-school distance.

*Generic advertisements and promotions not specifically appealing to children.* These measures included general practices not specifically relevant to children: availability and types of promotions (free samples are banned in California), branded marketing materials, health promotional or warning messages related to marijuana, and images or wording indicative of marijuana. Field workers also visually measured the size of the biggest exterior advertisement. Although California does not restrict size of advertisements in RMDs, some other states do. For instance, Washington requires advertisements to be no larger than 1,600 square inches.

*Access restrictions.* These measures included exterior signs about age limit, compliance with age verification before customers

entering sales area (required in California), and presence of security personnel and surveillance cameras (required in California).

*Other potential sources of exposure to marijuana.* These measures included smelling marijuana before entering premises, and observations of on- and off-premise consumption (on-premise consumption is banned in most cities in California).

## Results

### *School/neighborhood characteristics and dispensary distance to schools*

The following analysis was conducted at school level (school N = 333).

*School and neighborhood characteristics.* The students in these schools were predominantly Hispanic (52.0%) and white (26.1%). Most schools were in urban (43.2%) or suburban (50.2%) areas. Half of the census tracts where these schools were located were lower income areas (census tracts with median income below the median of all California tracts; Table 1).

*Proximity of dispensaries.* Calculated with the “As the Crow Flies” method, the median dispensary-to-school distance was 20211.5 feet or 3.8 miles. No RMDs were located within a 600-foot radius of schools. About 19.5% RMDs were located within a .5- to 1-mile walkable distance, and 24.3% RMDs were within 3 miles that are easily reachable by bike or vehicles. In total, 44% of schools had RMDs located within 3 miles. After we stratified schools by urbanicity status, a larger proportion of urban schools (52.1%) had their nearest RMDs located within 3 miles compared with suburban schools (39.5%) and rural schools (22.7%). Network distance by mode of transportation is reported in Table A3. After accounting for road networks, more than one third of the schools had RMDs located within a 3-mile walking/cycling/driving distance (Table 2).

### *Main analysis results*

The main analysis used unique dispensaries as the unit of analysis (dispensary N = 163).

*Products and advertisements appealing to children on the interior of RMDs.* On the interior, 59.5% RMDs had child-appealing products/packages, 35.6% had child-appealing paraphernalia, and 27.0% had child-appealing advertisements. Summing up the three categories, nearly three fourths (74.2%) of the RMDs had child-appealing marketing practices in at least one category (Table 3). Figure A2 presents maps of RMDs by the availability of interior child-appealing marketing. Table 4 suggests that there appeared to be a negative relationship between the availability of interior child-appealing marketing and dispensary-to-school distance: the closer RMDs were to a school, the higher the proportion of RMDs had interior child-appealing marketing.

*Products and advertisements appealing to children on the exterior of RMDs.* On the exterior, only one RMD had child-appealing advertisements, and only two RMDs had child-appealing products, packages, or paraphernalia (Table 3).

**Table 1**  
Characteristics of schools and school neighborhoods (school N = 333)

	Mean/% (SD)
<b>School characteristics</b>	
Total students, number, mean (SD)	1662.5 (794.5)
Race/ethnicity, % (SD)	
White	26.1 (22.5)
Hispanic	52.0 (27.4)
Asian	11.8 (13.9)
Black	5.9 (7.9)
Students eligible for free or reduced-price lunch, % (SD)	55.4 (27.2)
Urbanicity <sup>a</sup> , %	
Urban	43.2
Suburban	50.2
Rural	6.6
<b>Neighborhood (census tract) characteristics</b>	
Total population, number, mean (SD)	4966.6 (2003.5)
Population under age 21 y, % (SD)	28.3 (8.8)
Race/ethnicity, % (SD)	
White	40.3 (26.2)
Hispanic	37.0 (25.8)
Asian	14.0 (14.5)
Black	5.2 (8.6)
Poverty rate, % (SD)	13.4 (15.7)
Median household income, \$, mean (SD)	32578.7 (15762.9)
Median household income below the median of all California census tracts, %	49.0
Residents living one year or longer, % (SD)	98.8 (.9)
House occupancy, % (SD)	
Vacant house	7.8 (9.8)
Owner occupied	49.8 (22.7)
Renter occupied	42.3 (22.4)

SD = standard deviation.

<sup>a</sup> Urbanicity classification for public schools was obtained from the National Center for Education Statistics. There are four basic locale types in NCES: city, suburban, town, and rural. In this study, we grouped "suburban" and "town" into "suburban."

*Generic advertisements and promotions not specifically appealing to children on the interior of RMDs.* Most RMDs (76.1%) had promotional activities on the interior, with the most common activity being daily or weekly deals (40.5%), followed by first-time purchase deals (28.8%) and discounts (27.6%). It is worth noting that 27.6% of RMDs offered free samples. More than one-third (39.3%) had branded materials. Nearly one-third (30.7%) had materials promoting health benefits, but only 18.4% displayed health warning messages (Table 3).

*Generic advertisements and promotions not specifically appealing to children on the exterior of RMDs.* Very few RMDs had promotional items (1.8%), branded materials (2.5%), or materials related to health (3.0%) on the exterior. About 62.6% of RMDs had images

or wording indicative of marijuana. More than one-third posted exterior advertisements, and 12.9% had at least one advertisement larger than 1,600 square inches (Table 3).

*Access restrictions and other potential sources of exposure to marijuana.* Most RMDs (84.1%) placed no signs on age limit, and 1.2% placed inaccurate signs. Almost all RMDs (98.2%) checked ID before customers entered sales area. All the RMDs had surveillance cameras inside or outside, but field workers observed security personnel in only 39.9% RMDs. In one fourth of the RMDs (25.2%), marijuana was smelled before entering premises. Field workers observed on-premise consumption in 11.7% RMDs and off-premise consumption near 3.1% RMDs (Table 5).

### Secondary analysis results

Results using school as the unit of analysis are reported in Tables A4 and A5 (school N = 333). The results were comparable to those from the main analysis.

## Discussion

This study demonstrated that, in the early stage of marijuana commercialization in California, point-of-sale marketing practices that are appealing to children were minimal on the exterior of the RMDs around schools. However, such practices were abundant on the interior. Marketing practices not specifically appealing to children were common on both the interior and exterior of the RMDs.

Given the age limit, RMDs' exterior marketing might be the most concerning source of exposure for children. It is reassuring that child-appealing marketing was rarely observed on the exterior of the RMDs around schools. Yet, three fourths of the RMDs had some form of child-appealing marketing on the interior, which violated the California laws. Although children should have little direct access to the interior, child-appealing items may be available to children through indirect pathways and should not be overlooked. For instance, children's social networks such as older relatives, peers, or caregivers are their important sources of drugs [19]. A study reported that almost three fourths of underage users obtained marijuana from friends, relatives, or family members [20]. Child-appealing products, paraphernalia, or promotional materials could then be made available to children through these adults who are eligible for marijuana purchase. Particularly, about 30% of RMDs violated the California law to offer free samples, which could be taken out of the dispensaries and given away to children. These child-appealing items in RMDs could also be resold to children in

**Table 2**  
"As the Crow Flies" distance between school and the closest recreational marijuana dispensary (school N = 333)

As the Crow Flies distance between dispensary and school	All schools (N = 333)	Urban (N = 144)	Suburban (N = 167)	Rural (N = 22)
Less than 600 ft <sup>a</sup> , n (%)	0 (0)	0 (0)	0 (0)	0 (0)
600–2,640 ft (.5 mile), n (%)	0 (0)	0 (0)	0 (0)	0 (0)
2,640–5,280 ft (1 mile), n (%)	65 (19.5)	40 (27.8)	25 (15.0)	0 (0)
5,280–10,560 ft (2 miles), n (%)	45 (13.5)	21 (14.6)	21 (12.6)	3 (13.6)
10,560–15,840 ft (3 miles), n (%)	36 (10.8)	14 (9.7)	20 (12.0)	2 (9.1)
More than 15,840 ft (3 miles), n (%)	187 (56.2)	69 (47.9)	101 (60.5)	17 (77.3)
Ft. mean (SD)	49881.8 (80885.6)	50936.5 (84656.3)	393480 (51649.4)	122939.1 (164507.9)
Ft. median (interquartile range)	20211.5 (47770.6)	14692.8 (51564.3)	22000.3 (39905.2)	68132.4 (133316.8)

SD = standard deviation.

<sup>a</sup> Banned in California.

**Table 3**  
Advertising and promotional activities in recreational marijuana dispensaries around California schools (dispensary N = 163)

	Interior, n (%)	Exterior, n (%)
Products and advertisements appealing to children		
Child-appealing products/packages <sup>a</sup>		NA
Yes	97 (59.5)	
No	66 (40.5)	
Child-appealing paraphernalia <sup>a</sup>		NA
Yes	58 (35.6)	
No	105 (64.4)	
Child-appealing advertisements <sup>a</sup>		
Yes	44 (27.0)	1 (.6)
No	119 (73.0)	162 (99.4)
Child-appealing products/packages, paraphernalia on the exterior or visible from the exterior <sup>a</sup>		NA
Yes		2 (1.2)
No		161 (98.8)
Summary of child-appealing marketing categories		
None	42 (25.8)	160 (98.2)
Child-appealing marketing in one category	63 (38.7)	3 (1.8)
Child-appealing marketing in two categories	38 (23.3)	NA
Child-appealing marketing in 3 categories	20 (12.3)	
Generic advertisements and promotions not specifically appealing to children		
Product and price promotions		
Yes (any of the following)	124 (76.1)	3 (1.8)
Daily/weekly deals	66 (40.5)	NA
First-time purchase deals	47 (28.8)	
Product discounts	45 (27.6)	
Free samples <sup>a</sup>	45 (27.6)	
Loyalty programs	36 (22.1)	
Early bird/happy hour specials	21 (12.9)	
Social medical review or referral	6 (3.7)	
Other	9 (5.5)	
No	39 (23.9)	160 (98.2)
Branded marketing materials		
Yes	64 (39.3)	4 (2.5)
No	99 (60.7)	159 (97.6)
Signs, posters, advertisements, or giveaway materials that		
Promote health benefits	44 (27.0)	2 (1.2)
Display health warnings	24 (14.7)	3 (1.8)
Both	6 (3.7)	0 (0)
Neither	101 (62.0)	158 (96.9)
Images or wording indicative of marijuana		
Yes		102 (62.6)
No		61 (37.4)
Size of the biggest advertisement, square inches		
No advertisement		105 (64.4)
Below 288		25 (15.3)
Between 288 and 1,600		12 (7.4)
Between 1,600 and 4,800		14 (8.6)
Over 4,800		7 (4.3)

NA = not applicable.

<sup>a</sup> Banned in California.

illicit markets by street dealers. Research on tobacco and alcohol have suggested that children are exposed to and influenced by tobacco and alcohol products and point-of-sale marketing despite the age limit for purchase [21–24]. Whether and how the marketing activities inside of RMDs impact children's perceptions and behaviors should be examined in future research.

**Table 4**  
Availability of child-appealing point-of-sale marketing in recreational marijuana dispensaries by "As the Crow Flies" distance to schools (school N = 333)

As the Crow Flies distance between dispensary and school	All RMDs, N	RMDs with any child-appealing marketing activities	
		Interior, n (%)	Exterior, n (%)
Less than 600 ft	0	0 (0)	0 (0)
600–2,640 ft (.5 mile)	0	0 (0)	0 (0)
2,640–5,280 ft (1 mile)	65	52 (80.0)	3 (4.6)
5,280–10,560 ft (2 miles)	45	34 (75.6)	0 (0)
10,560–15,840 ft (3 miles)	36	25 (69.4)	0 (0)
More than 15,840 ft (3 miles)	187	121 (64.7)	2 (1.1)

Meanwhile, exterior retail environments not specifically relevant to children still warrant further attention. For instance, 63% of RMDs had image or wording indicative of marijuana on the exterior. One third of the RMDs had generic advertisements, and some advertisements were of a relatively big size. Marijuana could be smelled outside of 25% RMDs. All these might potentially increase perceived presence of RMDs in the neighborhoods and shape children's social norms.

Approximately half of schools had RMDs located within a 3-mile distance that is reachable to children by walking, cycling, or driving. Some RMDs were located further away, especially in suburban or rural areas. Nonetheless, children are not free from exposure to RMDs even if RMDs are located more than 3 miles away from schools. In 2009, the average travel distance from home to school among all school children was 4.4 miles; among high school students, the average distance was even longer (5.5 miles) [25]. The travel distance was also increasing over time

**Table 5**  
Access restrictions and other potential sources of exposure to marijuana in recreational marijuana dispensaries around California schools (dispensary N = 163)

	n (%)
Access restrictions	
Exterior signs stating age limit policy	
No sign	137 (84.1)
Must be 18 y or older	2 (1.2)
Must be 21 y or older	24 (14.7)
Age verification before entering sales area <sup>a</sup>	
Yes	160 (98.2)
No	3 (1.8)
Security personnel <sup>a</sup>	
Yes	65 (39.9)
No	98 (60.1)
Surveillance cameras <sup>a</sup>	
Exterior	6 (3.7)
Interior	20 (12.3)
Both	137 (84.1)
Neither	0 (0)
Other potential sources of exposure to marijuana	
Smelling marijuana before entering premise	
Yes	41 (25.2)
No	122 (74.9)
Anyone using marijuana, observed on-premise <sup>b</sup>	
Yes	19 (11.7)
No	144 (88.3)
Anyone using marijuana, observed off-premise	
Yes	5 (3.1)
No	158 (96.9)

<sup>a</sup> Required in California.

<sup>b</sup> Banned in most cities in California.

[26]. An interesting exploratory observation indicated that, compared with RMDs located further away from schools, a larger proportion of RMDs in reachable distance to schools had interior child-appealing marketing. It is possible that RMDs intentionally targeted children if they were in closer proximity of schools. Unfortunately, our study was not able to test this hypothesis directly.

Almost all the audited RMDs followed California rules on age verification. If continuous monitoring and enforcement are not in place, however, children might get access to abundant child-appealing marketing practices inside of the dispensaries, the consequences of which could be grave. Furthermore, exterior signs of age limit were absent in more than 80% RMDs, and security personnel were only observed in 40% RMDs. These might increase the risks of accidental or even intentional attempts of children to enter RMD premises, who would be then exposed to interior marketing in waiting area.

Compared with laws in other states, California regulations on child-appealing marketing seem to be vague and less comprehensive during the study period. Because content restrictions are inherently subjective, it might be challenging for California RMDs to comply and for regulators to enforce without objective, operationalizable measures of “child-appealing.” Fortunately, after this study was completed, California released new regulations in January 2019 on child-relevant products and marketing. Specifically, marijuana products and packages “shall not use any depictions or images of minors” and “shall not contain the use of objects, such as toys, inflatables, movie characters, cartoon characters, or include any other display, depiction, or image designed in any manner likely to be appealing to minors” [27]. These texts are expected to provide clearer guidance to law compliance and enforcement. In addition to prohibitions in laws, California could also consider screening content materials such as packages before they are available in RMDs. For instance, Massachusetts allows manufacturers to submit artwork to a regulatory board for review to ensure nonchild-appealing packaging. Standardized packaging might be another alternative, which has shown effectiveness in tobacco control outside of the U.S. [28].

This study has limitations. First, this study used a cross-sectional design to capture a snapshot in summer 2018, approximately half a year after California’s commercialization of marijuana. This unique transition period was characterized with a lack of law enforcement, delay of dispensary licensing, and inadequate understanding of laws. As the legal market matures and government makes endeavors on law interpretation and enforcement, we might expect a stronger compliance with laws and possibly a reduction in marketing practices. The findings may not be generalizable to other time points in California. Second, our observations were largely constrained within the regulatory regime in California and may not be generalizable to other states where different regulatory measures are in place. Third, frequency or quantity measures in each marketing category would be more informative than simple binary indicators for availability. Unfortunately, a dispensary often displays hundreds or even thousands of products, packages, paraphernalia, and advertisements. Obtaining frequency or quantity information requires the field workers to spend a considerably longer time evaluating the RMD environment, which is infeasible in practice. Fourth, California laws lacked specific details related to children during the study period. The classification of child-appealing was informed by laws in other states and

constructed with authors’ own understanding, which may not reflect California lawmakers’ intention or completely align with recently released new regulations. Furthermore, there might be inevitable measurement errors even after two field workers discussed and resolved discrepancies between them. Finally, this study only gathered data on RMDs in closest proximity to public schools. Results may not be generalizable to RMDs around private schools or children’s homes. To improve representativeness, future research is encouraged to audit a random sample of RMDs.

This study reported active and abundant point-of-sale marketing practices that are appealing to children on the interior of RMDs around schools in California. Marketing practices not specifically appealing to children were also common on both the interior and exterior of RMDs. Dispensaries’ violation of age verification laws, lack of security personnel, and presence of child-appealing marketing should be continuously monitored and prevented, particularly in dispensaries in closer proximity to schools. Future studies are also needed to examine whether and how point-of-sale marketing might impact children’s perceptions and behaviors and what policies might be effective for preventing children’s exposure.

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### Supplementary Data

Supplementary data related to this article can be found at <http://doi.org/10.1016/j.jadohealth.2019.07.023>.

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