



Marijuana Promotion Online: an Investigation of Dispensary Practices

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Abstract

Marijuana product advertising will become more common, as the use of medical and/or recreational marijuana becomes increasingly legal in the USA. In this study, we investigate the marketing tactics being used on marijuana dispensary websites in the USA that could influence substance use behaviors. One hundred dispensary websites were randomly selected from 10 states that allowed the legal use of medical or recreational marijuana and had at least 10 operational dispensaries. Three dispensaries were excluded due to non-functioning websites, leaving a sample of 97 dispensaries. Content analysis was conducted on these dispensaries' websites, with the primary areas of focus including website age verification, marijuana effects, warnings, and promotional tactics. Among the 97 dispensaries, 75% did not include age verification. Roughly 30% offered online ordering and 21% offered delivery services. Sixty-seven percent made health claims pertaining to medical conditions that could be treated by their marijuana products, with moderate or conclusive evidence to support their claims. Less than half of the dispensaries (45%) advised consumers of possible side effects, and only 18% included warnings about contraindications. Nearly half (44%) offered reduced prices or coupons, 19% offered “buy one get one free” offers, and 16% provided giveaways or free samples. Our findings indicate that marijuana dispensary websites are easily accessible to youth. In addition, only a small amount of the websites advised consumers about possible side effects or contraindications. This study suggests the need for surveillance of marijuana commercialization and online advertising especially in the context of state policy reforms.

Keywords Marijuana · Advertising · Online · Policy

Introduction

Marijuana remains illegal at the federal level, but the movement to legalize marijuana at the state level has gained momentum across the USA. In recent years, support for legalization has amplified, and currently, 28 states and the District of Columbia have legalized marijuana in some form (National

Organization for the Reform of Marijuana Laws [NORML], 2016). As legalization shifts toward leniency, businesses involved with the growing sales of marijuana will undoubtedly expand. A field of research indicates that exposure to alcohol and tobacco advertising can shift attitudes toward normalization of use and increase likelihood of use, and this advertising disproportionately targets youth and adolescents (Anderson et al. 2009; D'Amico et al. 2015). Thus, in consideration of the expanding marijuana market and the known potential risks associated with marijuana use including dependence, respiratory and cardiovascular risks, cognitive impairment, and increased motor vehicle accidents (Volkow et al. 2014), there is awareness that establishing advertising regulations surrounding the sale of marijuana could help to protect the health of young people (Feeney and Kampman 2016).

Numerous states (e.g., Colorado, Washington, New York) explicitly prohibit the direct targeting of marijuana promotions to children (Colorado Department of Revenue 2013; New York State Department of Health 2014; Washington State Legislature 2013). Still, marijuana advertisements exist online and on social media, where there are minimal security

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measures to prevent their viewing among underage youth (Bierut et al. 2017; Krauss et al. 2017; Leafly 2017b). Underage exposure to marijuana advertisements can be especially concerning when it coincides with dispensary practices that facilitate easy access to marijuana. For example, the option for customers to pre-purchase marijuana online could streamline and expedite a customer's pick-up experience. In addition, a direct-to-home delivery option could ease one's ready access to marijuana. Given that previous science indicates that minors can successfully purchase cigarettes from internet vendors (Ribisl et al. 2003), it is timely to investigate dispensary practices that authorize underage viewing of its online promotion and/or facilitate access to marijuana upon a subsequent online purchase.

It is also opportune to study the marketing of marijuana through the promotion of its use for medical/health benefits. Currently, there is relative consensus that marijuana reduces nausea and vomiting, helps with chronic pain, and improves spastic symptoms for multiple sclerosis patients (National Academies of Sciences, Engineering, and Medicine 2017). However, beyond those, there are numerous conditions that now appear on several states' approved lists. For instance, hepatitis C, Crohn's disease, Parkinson's disease, and Tourette's syndrome are qualifying medical conditions by state law for the use of medical marijuana (D'Amico et al. 2015), but the efficacy of marijuana for use in this way is supported only by low-quality evidence (Whiting et al. 2015). Nevertheless, some dispensaries may be financially motivated to increase customer sales by touting the medical/health benefits of marijuana as suggested by emerging evidence (Bierut et al. 2017).

Additionally, related studies on alcohol and tobacco online vendors suggest that dispensaries may employ special promotions including price discounts and loyalty programs to attract new consumers and retain loyal ones. For example, in a content analysis of internet alcohol vendor websites, investigators found that most vendors utilized discount pricing and/or customer loyalty programs to boost sales (Williams and Schmidt 2014). Similar tactics were observed in an analysis of online tobacco retailers, where popular promotional tactics included advertising tax-free or reduced price cigarettes (Ribisl et al. 2001). No known studies have yet investigated marijuana dispensaries' use of online promotional practices, but evidence signals their effectiveness at encouraging alcohol and tobacco purchasing behaviors among youth as well as individuals who are socially and economically disadvantaged (Brown-Johnson et al. 2014; McClure et al. 2006).

This exploratory and timely study is the first known of its kind to investigate how both medical and recreational marijuana dispensaries are currently being advertised online by dispensary websites across the USA. Our study has public health relevance when considering the conclusive alcohol and tobacco studies that associate advertising exposures to greater intent to

use these products, their more frequent use, and their use in greater quantities (Grube 2004; US Department of Health and Human Services 2012). Informed by Williams and Schmidt (2014), who investigated internet alcohol vendor websites across five critical topics of study, we examine in the present study the extent to which dispensaries (1) verified age before accessing their websites, (2) attempted to provide easy access to marijuana products through delivery and pre-order systems, (3) made health claims regarding their products, (4) gave a health warning or contraindications to use, and (5) provided promotions to consumers. We also contextualized our findings within states' existing regulations regarding dispensary advertising practices.

Methods

Dispensary Selection

In June 2016, we consulted NORML (2016) to identify states with legal medical and/or recreational marijuana use. We reviewed websites of state government agencies overseeing the licensing of marijuana dispensaries for lists of licensed marijuana dispensaries for each of these 24 states (note, some states passed/enacted medical marijuana policies later in 2016, but our sample only included those in effect by June 2016). State government agencies were contacted via phone when a list could not be obtained from their website. For some states, comprehensive lists were not yet available; dispensary lists could only be given to registered medical patients, or dispensaries were not legally allowed by the state but were still operational according to an online dispensary directory Leafly, which is well regarded as a source for dispensaries and describes itself as "the world's largest cannabis information resource" (Leafly 2017a). In such cases, when a list of dispensaries could not be obtained from the state agency, a list of dispensaries for the state was drawn from Leafly.com (Leafly 2017b).

States with 10 or more operational dispensaries that had working websites had a more established online presence relative to those states with < 10 dispensaries that had working websites. These criteria resulted in a total of 10 states eligible for this study: Arizona, California, Colorado, Illinois, Michigan, Montana, Nevada, New Mexico, Oregon, and Washington (Fig. S1 available online). This purposive sample included three states that had legalized both medical and recreational use. This proportion (3/10) is reflective of current state policy in the USA, in which a similar proportion of states (8/29) have legalized recreational use.

A random sample of 10 dispensaries was drawn from each of these 10 states for analysis using SAS proc surveyselect (SAS Institute, Inc., Cary, NC), for a total of 100 dispensaries (Table 1). For states that allowed both medical and

Table 1 States with marijuana dispensaries analyzed in this study

State	Medical use legal? ^a	Recreational use legal? ^a	Dispensaries allowed? ^a	Source of dispensary list	Number of dispensaries on list	Number of dispensary websites analyzed ^b
Arizona	Yes	No	Yes	Leafly ^c	75 medical	10 medical
California	Yes	No	Yes	Leafly ^d	184 medical	10 medical
Colorado	Yes	Yes	Yes	State agency	530 medical 432 recreational	5 medical 5 recreational
Illinois	Yes	No	Yes	State agency	38 medical	10 medical
Michigan	Yes	No	No	Leafly ^e	99 medical	10 medical
Montana	Yes	No	No	Leafly ^e	29 medical	10 medical
Nevada	Yes	No	Yes	State agency	31 medical	10 medical
New Mexico	Yes	No	Yes	State agency	36 medical	10 medical
Oregon	Yes	Yes	Yes	State agency	51 medical 359 recreational	5 medical 5 recreational
Washington	Yes	Yes	Yes	State agency	297 medical 365 recreational	5 medical 5 recreational

^a Source of information: <http://norml.org/states>

^b Randomly selected from the full list of the state's dispensaries; 5 medical and 5 recreational dispensaries were randomly selected to total 10 dispensaries reviewed

^c Arizona only releases a list of registered dispensaries to registered patients

^d California Department of Consumer Affairs Bureau of Medical Marijuana Regulation did not yet have a list of licensed dispensaries

^e Both Michigan and Montana did not legally allow dispensaries, but operational dispensaries were found on Leafly.com

recreational dispensaries (3 of the 10 states: CO, OR, WA), we randomly chose 5 dispensaries on the medical dispensary list and 5 dispensaries on the recreational dispensary list to total 10 within that respective state. Note that some states could have both medical and recreational licenses. If a dispensary did not have a website, it was randomly replaced with another dispensary until one with a website was identified.

Coding Dispensary Websites

Three members of the research team initially reviewed approximately 20 dispensary websites from across the USA (not included in the final sample) in order to determine pertinent codes for analysis, and an initial codebook was developed including the domains outlined below. The three team members discussed and refined the codes, coming to an agreement that these codes would adequately address the purposes of the content analysis and that no relevant codes were missing or irrelevant codes included. An additional 20 dispensary websites from across the USA (not included in the final sample) were then coded by the same research team members. Coding discrepancies from this first set of dispensary websites were then used to further refine the codebook before the full set of 100 dispensaries was coded. Within each website, all pages were reviewed except videos and blogs/news pages because of the additional amount of time that coders would need to review these sections. The domains for coding are described below.

Prohibiting Underage Viewing of Dispensary Content The presence of an age verification process for entering the website was coded, including whether this involved (a) merely checking a box to indicate that the viewer is of legal age (18 or 21 years, depending on whether medical or recreational marijuana was sold), (b) entering a birth date, or (c) stricter verifications than entering a birth date.

Targeting and/or Easing Access for Potential Marijuana Consumers The coder noted whether a customer could order online for delivery (i.e., someone from the dispensary delivers marijuana directly to the customer's residence) or for in-store pickup. If online ordering was available, the coder noted whether the website outlined instructions or restrictions for ordering, including providing identification and/or providing a medical card/number or prescription.

Informing Consumers About Marijuana Effects Most websites provided menus of marijuana products available from the dispensary. These menus were reviewed to identify specific claims that were made by the dispensary describing what medical conditions could be treated with the marijuana product. Each health claim was documented from a long list of potential medical conditions (e.g., anxiety, appetite, depression, epilepsy/seizures, insomnia, headaches, pain, etc.). The full list of these medical conditions can be found in Table 2. Product menus were reviewed regardless of whether they were included in the dispensary's own website or the customer was linked to that dispensary's menu outside of the website (e.g.,

Table 2 Health claims made about marijuana when describing the effects of their products (N = 94)

Health claims made within menu				
≥ 50% of dispensaries	11–49% of dispensaries		≤ 10% of dispensaries	
<i>Anxiety/Panic attacks</i>	ADHD	Glaucoma	Alzheimer’s disease	Fibromyalgia
<i>Appetite</i> ^b	Arthritis	Inflammation	AIDS	Hepatitis C
Depression	Cancer	Mental illness	Anorexia nervosa	Menstrual problems
Insomnia	Epilepsy	Migraine/Headaches	Asthma	Neuropathy
Muscle spasms ^a	Fatigue	Multiple sclerosis	Autism	Parkinson’s disease
Nausea	Gastrointestinal disorders	PTSD	Autoimmune disorders	Sjögren’s syndrome
Pain			Colitis	Trauma
Stress/Relaxation			Crohn’s disease	Urinary systems condition
Health claims observed within the website, but outside of their menu				
≥ 20% of dispensaries	11–19% of dispensaries		≤ 10% of dispensaries	
<i>Anxiety/Panic Attacks</i>	ADHD	Glaucoma	ALS	High blood pressure
<i>Appetite</i> ^b	<i>AIDS</i>	Inflammation	Alzheimer’s disease	Hydrocephalus
Depression	Anorexia nervosa	Mental illness	Asthma	Menstrual problems
Epilepsy	Arthritis	Migraine/Headaches	Autism	Neuropathy
Insomnia	Cancer	Multiple sclerosis	Autoimmune disorders	Opioid dependence
Muscle Spasms ^a	Fatigue	Stress/Relaxation	Colitis	Parkinson’s disease
Nausea	Gastrointestinal disorders		Crohn’s disease	<i>PTSD</i>
Pain			Diabetes	<i>Tourette syndrome</i>
			Fibromyalgia	Trauma
			Hepatitis C	Urinary systems condition

Italics and bold represent conditions that have conclusive/substantial evidence or moderate evidence. *Italics* represent conditions that have limited evidence associated with marijuana therapies. Non-italics represent conditions that have little or no evidence associated with marijuana therapies (National Academies of Sciences, Engineering, and Medicine 2017)

ADHD attention-deficit/hyperactivity disorder, PTSD post-traumatic stress disorder, AIDS acquired immunodeficiency syndrome, ALS amyotrophic lateral sclerosis, Lou Gehrig’s disease

^a Evidence for muscle spasms as a symptom of Multiple Sclerosis

^b Evidence for increasing appetite in individuals with HIV/AIDS

provided a link that would refer the customer to an online dispensary directory such as Leafly or Weedmaps). If menus were provided for more than one location for a dispensary, the first menu advertised (i.e., first to be viewed within the site) was selected for coding. Separately, coders documented whether health claims were made on pages of the website outside of the product menu.

Each specific type of health claim was recorded as being linked to a specific type of marijuana product, including flower-based products (i.e., pre-rolled joints and blunts, buds, seeds), edibles, concentrates (i.e., high THC concentrated products such as shatter, budder/wax, resin, oil, vape cartridges, kief, hash), topicals (i.e., lotions, lip balm, lubrication), or other miscellaneous products (e.g., tinctures, capsules, bath salts). When coding health claims outside of the product menu, if the health claim was not made for a specific product type, it was recorded as a general marijuana health claim. Mentions for specific health claims were tallied for each type of marijuana product with response categories as one time, two to five times, >five times.

Warnings and Side Effects The research team documented whether any negative side effects following marijuana use were mentioned anywhere on the website (e.g., cognitive or

psychomotor impairment, dry mouth, anxiety, dizziness, dry eyes, paranoia, headaches, or other adverse effects). In addition, the presence of warnings about contraindications was also coded, including warnings about using marijuana and driving or using marijuana if the customer is pregnant or breastfeeding, has mental disorders, or other contraindications.

Promotional Tactics for Selling Products The use of promotional methods were recorded, including reduced prices/coupons, giveaways or free samples, “buy one get one free” offers/free gift with purchase, or customer membership with benefits. Selling or promoting novelty items was documented. Providing links to social media sites was also noted.

State Policies for Dispensary Advertising Practices

For each state in our study, we coded state policies regarding marijuana advertising related to (1) prohibiting targeting advertisements to people under the age of 21, (2) requiring statements regarding marijuana side effects and contraindications and/or warnings about its use, and (3) banning promotional tactics including giveaways, coupons, and distribution of branded merchandise. Policy data was retrieved from Leafly.com, which provides comprehensive and up-to-date

information on state regulations for marijuana advertising as a resource for marijuana businesses in order to help them observe these regulations (Leafly Staff 2017). Leafly provides links to each state's websites for a viewer to verify respective regulation information. A member of the research team checked each state's website to ensure that the Leafly information was accurate and reflected the correct state policies. Each state was then coded as "yes" or "no" depending on whether they had each policy.

Data Analysis

Each dispensary website, the unit of analysis, was coded by two of six trained research team members. For each dispensary coded, one of the coders was a senior member of the research team and the other was a junior member of the research team. Senior team members have advanced degrees in psychology and public health and prior content analysis experience (Bierut et al. 2017; Cavazos-Rehg et al. 2017), and junior team members were students in public health and psychology disciplines. Codes were entered into a REDCap (Research Electronic Data Capture) database hosted in the Biostatistics Division of Washington University School of Medicine. REDCap is a secure web-based application supporting data capture and management (Harris et al. 2009). Separately, health claims for each dispensary were documented in Excel spreadsheets. In order to address coding discrepancies, the two coders assigned to each dispensary engaged in a dialog to come to an agreement on the final assigned codes. The dispensary websites were archived using Archive-It, a website archiving system available through the university's library. The approach for our content analysis was performed in a manner to maximize trustworthiness by using random sampling of dispensaries from those of interest for our study (states with a large number of dispensaries with an online presence), ensuring that the final list of codes used adequately addressed the data, and using a team of two researchers to code each dispensary website and discuss discrepancies (Graneheim and Lundman 2004). We have also provided a clear description of the states and dispensaries of interest. While our results may not be transferable to states with a small number of dispensaries or those without an online presence, our results are representative of dispensaries with an online presence in states with an established dispensary system.

After resolving discrepancies in coding, data from REDCap and the Excel spreadsheets for health claims were imported into SAS version 9.4 for Windows (SAS Institute, Inc., Cary, NC) for analysis. Descriptive statistics were used to describe the dispensary's practices for age verification, ordering methods, health claims, warnings, and promotional tactics. The prevalence of the coded advertising practices used by dispensaries was compared by type of dispensary, which was defined based on whether the dispensary was licensed

to sell medical marijuana only or both medical and recreational marijuana. In states where both medical and recreational were legal, it was uncommon for a dispensary to sell only recreational marijuana among the dispensaries included in our sample; thus, only one dispensary of this nature was included in our sample. The prevalence of advertising practices was also compared across the presence of specific relevant state advertising policies (e.g., age verification practices by policies prohibiting/limiting targeting advertising to people under 21). Pearson's chi-square tests and Fisher's exact tests were used, with $p < 0.05$ considered statistically significant.

Results

Among the 100 dispensary websites chosen for analysis, three were excluded because one site was a Facebook page (i.e., not a regular website and thus had limited dispensary information), one website was no longer working once the codes were finalized (a 2-week lapse in time), and one was for a company that provided guidance for dispensary businesses trying to navigate the regulatory environment. We did not replace these three excluded websites. This left 97 dispensary websites for analysis (9 in Nevada, 8 in Oregon, and 10 in each of the following states: AZ, CA, CO, IL, MI, MT, NM, and WA). Among these 97 websites, 72 had only a medical license, 24 had a license for both medical and recreational sales, and 1 dispensary in CO had only a recreational license (excluded from comparisons by dispensary type).

Among the 10 states analyzed, 3 had no advertising policy at all (AZ, MI, and NM), 3 states had advertising policies that were not relevant to the codes in this study (CA, IL, and NV), and MT's policy prohibited advertising on any medium, including electronic media. As such, only 3 states had advertising codes applied (CO, WA, and OR), with OR having one (warning labels).

Age Verification

Among the 97 dispensaries, 73 (75%) did not include an age gate to verify that the viewer was of legal age (Fig. 1). Only 24 (25%) dispensaries had age verification in place before entering the website. Among these, most of the dispensaries (21/24) only asked the viewer to check a box indicating that they were of legal age. One dispensary required the viewer to enter their birthdate before entering the website and then allowed us to enter the site after entering a legal age. Two dispensary websites required a username and password that needed to be obtained by registering with the dispensary (both of these dispensaries were in NM); because we could not enter and view the content of these two sites, they were excluded from further analysis. In addition, one dispensary website required the viewer to check a box to verify legal age but did not allow

Fig. 1 Age verification methods used by dispensary websites ($N = 97$)



us to enter the site even after entering a legal age; this dispensary was also excluded from further analysis. Notably, the use of age verification was more common in the two states that have policies that directly limit advertising to people under the age of 21 (CO and WA; 15/20, 75%) compared with states that did not have this policy (9/77, 12%) (Fisher’s exact test, $p < 0.001$). In addition, dispensaries that provided both medical and recreational marijuana were more likely to use age verification for website entry (16/23, 70%) than those that only provided medical marijuana (4/70, 6%) (Fisher’s exact test, $p < 0.001$).

Ordering Methods

Among the 94 remaining dispensaries, 28 (30%) offered on-line ordering, and 20 (21%) offered delivery services. Delivery services were more common among medical dispensaries (20/70, 29%) than dispensaries that provided both medical and recreational marijuana (0/23, 0%) (Fisher’s exact test, $p = 0.003$). Among the 42 dispensaries that offered online ordering and/or delivery, 12 (29%) indicated that the customer would need to provide identification, and 14 (33%) indicated that the customer would need to provide their medical card/number or prescription at the time of the order or at pickup/delivery.

Health Claims

The types and frequencies of health claims made on the dispensary websites are shown in Table 2. Of the 94 dispensaries, 63 (67%) made claims pertaining to the medical conditions that could be treated by their marijuana products on a product menu (provided by 83 dispensaries). The health claims made

on product menus are summarized in the top half of Table 2. Notably, among the 63 that made health claims on the menu, 21 of the menus were powered by Leafly. In these cases, the menu offerings and prices differed between dispensaries, but items that were offered on multiple dispensaries had identical descriptions, meaning that the health claims made for these individual products were the same. Over half of the 94 dispensaries made claims that their menu products could help with pain, stress/relaxation, appetite, anxiety/panic attacks, insomnia/sleep problems, depression, nausea/stomach ailments, and muscle spasms (Table 2).

A total of 35 (37%) dispensaries made health claims on web pages other than a product menu (bottom half of Table 2). Health claims made on pages other than the product menus by $\geq 20\%$ of the dispensaries were for pain, appetite, anxiety/panic attacks, insomnia/sleep problems, depression, nausea, muscle spasms, and epilepsy/seizures. Some of the more rare health claims made on either a product menu or on pages other than product menus included autism, Hepatitis C, Alzheimer’s disease, AIDS, and autoimmune disorders, among others. The overall prevalence of health claims (whether within a product menu or outside of a product menu) did not significantly differ by type of dispensary (54/70, 77% among medical dispensaries; 19/23, 83% among dispensaries of both recreational and medical marijuana; Fisher’s exact test, 0.772).

A small proportion of the dispensaries (8/94, 9%) included specific comparisons of marijuana to other prescription or over-the-counter drugs (e.g., prescription pain killers). Finally, 24% (23/94) provided scientific journal citations or links to medical literature (18) and/or pictures of or quotes from medical professionals (8) to support the health claims made. Citing scientific literature or quotes from medical

professionals was more common among medical dispensaries (23/70, 33%) than dispensaries that provided both medical and recreational marijuana (0/23, 0%) (Fisher's exact test, $p = 0.001$).

Warnings and Side Effects

Figure 2 displays the side effects and warnings of contraindications provided to consumers on marijuana dispensary websites. Less than half (42/94, 45%) of the dispensaries warned consumers of possible side effects following marijuana use. Over 25% of dispensaries warned of the specific effects of paranoia, anxiety, dizziness, dry mouth, and dry eyes. Less commonly mentioned side effects included cognitive or psychomotor impairment, respiratory problems, the potential for addiction, and rapid heartbeat. Mentioning side effects did not differ significantly between medical dispensaries (28/70, 40%) and those with both medical and recreational sales (14/23, 61%) (Fisher's exact test, $p = 0.095$).

Warnings about contraindications were included on only 17 (18%) of the 94 dispensary websites. The most common contraindication warning was driving after using marijuana, followed by warnings about using or leaving marijuana products around children, and instructions not to use with other drugs/medications or alcohol. Other rarely mentioned contraindications were use of marijuana when pregnant or breastfeeding or among those with a mental disorder. Warning of contraindications was more common among dispensaries that provided both medical and recreational

marijuana (8/23, 35%) than medical dispensaries (9/70, 13%) (Fisher's exact test, $p = 0.028$).

Two states, OR and WA, had policies that indicated that advertisements must contain specific warnings. These states were significantly more likely to address side effects and contraindications, given that more than three-quarters (13/17, 76%) of websites from these states mentioned side effects or warned of contraindications compared to less than half (30/77, 39%) of websites in states that did not require such warnings (chi-square $df = 7.9$, $p = 0.005$).

Promotional Tactics

Nearly half of the dispensaries (41/94, 44%) offered reduced prices or coupons, and nearly a third (29/94, 31%) offered customer memberships to their dispensary in order to obtain a “perk” and/or benefit for being a regular customer (e.g., earning reward points, exclusive offers). In addition, 19% (18/94) offered “buy one get one free” offers or free gifts of marijuana-related products with purchase, and 16% (15/94) provided giveaways or free samples. Over a quarter (26/94, 28%) of the dispensaries sold or promoted novelty accessory items or clothes (e.g., t-shirts, hats). The large majority (78/94, 83%) of dispensary websites included links to the dispensary's social media pages. WA was the only state in our study to ban giveaways, coupons, and distribution of branded merchandise, and this state was less likely to provide any of these promotions than other states (1/9, 11% vs 56/85, 66% respectively, Fisher's exact test, $p = 0.002$). The use of any of the

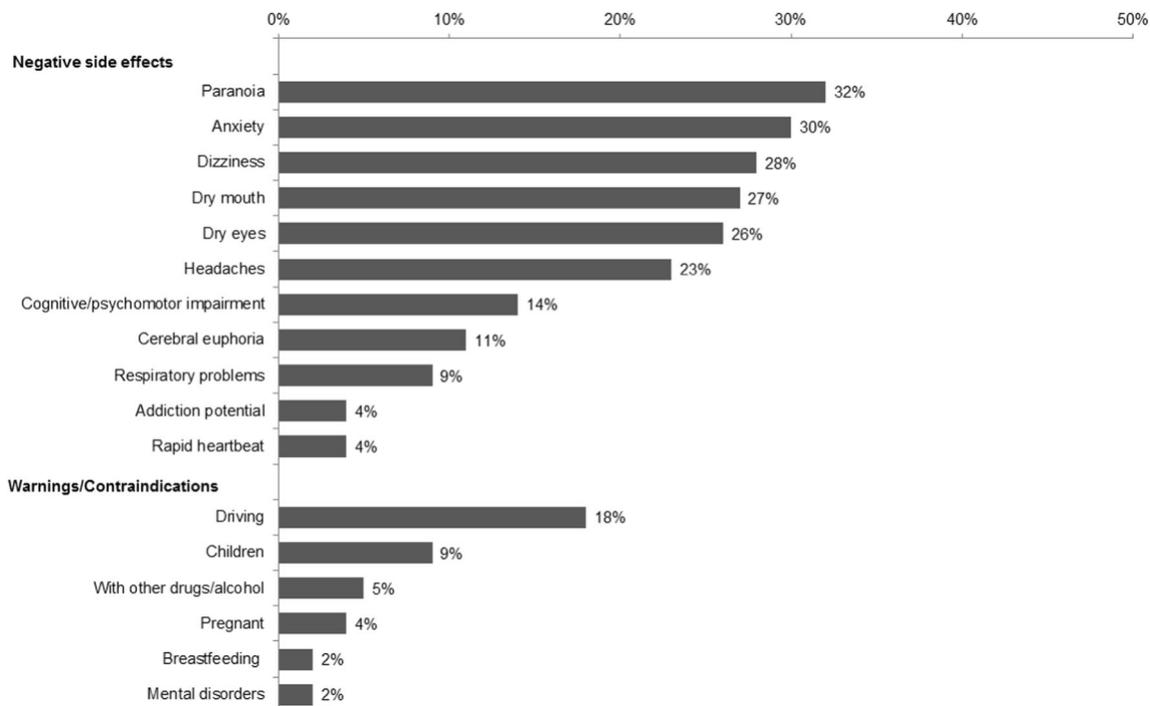


Fig. 2 Percent of dispensaries that included specific negative side effects and warnings of contraindications on their website ($N = 94$)

previously mentioned promotional tactics did not differ significantly by type of dispensary (47/70, 67% of medical dispensaries; 12/23, 52% of dispensaries selling both medical and recreational marijuana; Fisher's exact test, $p = 0.219$).

Among 70 dispensaries that only had a medical sales license, 38 (54%) included language suggesting recreational use, and this language was often used when describing specific products. Some examples include “uplifting, creative euphoric high,” “strong soaring long-lasting high,” “time-bending cerebral space,” “blissful,” or “be ready for a ride of a lifetime.”

Discussion

This exploratory and timely study is the first known of its kind to investigate how both medical and recreational marijuana dispensaries are currently being advertised online by dispensary websites across the USA. Upon examining nearly 100 dispensary websites, we observed a number of patterns that emerged between the sites with regard to dispensaries' advertising strategies. First, we observed that most dispensary websites did not implement any age restrictions/verifications whatsoever that would prohibit minors from viewing site content, or when they were implemented, most were ineffective (e.g., check boxes that could be bypassed easily). This finding corroborates research on alcohol, tobacco, and e-cigarette websites, which similarly found a low percentage of online vendors utilizing age restrictions (Jenssen et al. 2009; Ribisl et al. 2003; Williams and Schmidt 2014). The use of age verifications has been encouraged as a means to prevent children from accessing inappropriate content online; however, the research is mixed in terms of validating the efficacy of the age verifications (Jones et al. 2014; Nash et al. 2012; Williams et al. 2015). Nevertheless, exposure to marijuana advertisements increases the likelihood of intent to use marijuana among children and supports the need to protect young people from viewing online marijuana promotions (D'Amico et al. 2015). With respect to the potential impact of state policies on dispensary practices to implement online age restrictions/verifications, our findings suggest that state regulations may have some influence, at least to some extent, because the dispensaries in states that explicitly prohibit the marijuana industry from engaging in youth-targeted advertising were more likely to implement age-verification practices.

Moreover, we found that some dispensaries eased access to marijuana through offers of online ordering and/or home delivery. As a whole, there is still much to learn about how advertising marijuana online entices consumers to subsequently use marijuana in a manner that increases the risk for negative side effects. Nonetheless, we view the promotion of marijuana use through encouraging its use and/or easing its access via delivery/online ordering as a relevant and timely

field of research that is worthy of continued study, especially with regard to how these practices may facilitate its use among underage youth who are at greater risk for potential negative consequences that stem from marijuana use (Alvaro et al. 2013; D'Amico et al. 2015; Krauss et al. 2017).

We also found that most of the dispensary websites made at least one claim about the use of marijuana for medical/health benefits, suggesting that this online advertising practice is common among dispensaries. Despite a lack of state policies on marijuana health claims, we did observe that dispensaries that engaged in this practice had moderate or conclusive evidence to support most of their health claims made about marijuana (National Academies of Sciences, Engineering, and Medicine 2017). However, some of the health claims made about marijuana for the treatment of symptoms related to epilepsy, anorexia, Parkinson's Disease, and ALS that were advertised by some dispensaries have limited or insufficient scientific evidence that support marijuana's efficacy for use in this way (National Academies of Sciences, Engineering, and Medicine 2017). While such health claims could be in line with states' qualifying conditions for medical marijuana use, it may be important for dispensaries to distinguish between health conditions that have been scientifically validated to be effectively treated with marijuana versus those that are not yet backed by empirical evidence so that patients are not misled about the proven efficacy of medical marijuana. This recommendation was recently endorsed by the Food and Drug Administration (FDA), which warned four companies selling marijuana-derived dietary supplements to stop touting their marijuana products as cures for cancer, a common but unproven claim in the industry (Kaplan 2017).

The alcohol and tobacco industries also illustrate that distinguishing between qualifying conditions with and without evidence is a shared responsibility. Although most of the burden to distinguish between conditions with evidence and conditions without evidence may fall on the prescribing physician, the advertising practices of the alcohol and tobacco industries are regulated in order to minimize potential harms associated with their use. Therefore, it may be that similar regulations for marijuana dispensaries could work to facilitate responsible marketing practices including the use of medical claims that are only supported by the scientific research and recommendations for ingestion that align sufficiently with guidelines that are established by public health experts (Babor et al. 2013).

We also found that dispensary websites rarely listed adverse side effects such as cognitive problems, early onset of psychotic symptoms, addiction, and altered brain development that could follow marijuana consumption, which would be especially important for young marijuana users who are perusing dispensary sites (Batalla et al. 2013; Hall and Degenhardt 2014; Leafly 2017b; National Institute on Drug Abuse [NIDA] 2017; Volkow et al. 2014). Notably, however,

dispensaries were significantly more likely to list the potential consequences of marijuana use when the states in which they were located had explicit policies that encouraged this practice. Thus, expanding this policy across all states where marijuana is legally sold may be worthwhile for increasing awareness about the potential adverse side effects that follow marijuana use.

Another common online practice of dispensaries was the advertisement of loyalty programs, perks, and/or price discounts. The efficacy of increasing the affordability of marijuana to boost its sales is unknown; however, related campaigns have benefited the alcohol and tobacco industries by gaining market share, attracting new users, and retaining loyal consumers (Altman et al. 1996; Kuo et al. 2003; McClure et al. 2006). Notably, policymakers advocate for alcohol and tobacco price inflations to reduce population-level use and related harms (for e.g., Hirono and Smith 2017). Similar control measures could be considered for marijuana, but the potential for unintentional hardships among certain vulnerable subpopulations, including those who lack resources to aid cessation efforts and/or use marijuana therapeutically, will need to be mitigated. Likewise, we observed that the encouragement of marijuana for recreational use (i.e., in order to feel high) was a common promotional tactic even across dispensaries licensed to distribute only medical marijuana (not recreational marijuana). Our findings, as a whole, are significant for emphasizing the variety of aggressive online sales and marketing tactics of dispensaries, including those solely licensed to distribute medical marijuana that extend to such measures as encouraging marijuana use to get “high.”

Data suggests that exposure to alcohol and tobacco advertising is associated with increased consumption, particularly for youth (Smith and Foxcroft 2009), and early research shows similar patterns related to marijuana advertising (D’Amico et al. 2015). Moreover, research on the alcohol and tobacco industries has shown that advertisements disproportionately target black and Hispanic neighborhoods (Altman et al. 1991). It is possible that similar patterns may emerge in marijuana advertising, and it is important to prevent such tactics in order to help reduce existing health disparities.

Developing a better understanding of this type of advertising and marketing, its intent, and its effect on young people is necessary in the path to preventing vulnerable populations from being targeted by marketers, especially the marketing of potentially harmful products. This is particularly applicable in the relatively new area of marijuana advertising, as marijuana becomes increasingly legal in the USA. It is critical that practitioners, academics, and policy makers in marketing, public health, and other fields recognize and understand targeted marketing as having a specific contextual influence on the health of children and adolescents and, for different reasons, ethnic minority populations and other populations who may benefit from public health protections (Grier and Kumanyika 2010). An early study investigated the relationship between

adolescents’ appraisals of anti-marijuana television ads used in the National Youth Anti-drug Media Campaign with future marijuana use and had positive outcomes (Alvaro et al. 2013). Users reporting more positive attitudes toward the anti-marijuana ads were less likely to report intention to use marijuana and continued use of it at 1-year follow-up. These findings may inform designers of persuasion-based prevention campaigns, guiding pre-implementation efforts in the design of ads that target groups find appealing and thus influential.

This study has some limitations. We chose to sample 10 websites from each of the 10 states to reach a total sample size of nearly 100 websites in aggregate that were coded. We did not include states with fewer than 10 dispensaries, and our sampling strategy was not proportional to the number of dispensaries in a state or the state’s size. Our approach was not intended to provide definitive conclusions of all dispensary practices found online, and it may be that accounting for trends over time (i.e., new medical marijuana policies are increasingly restrictive) and/or evaluating an even greater number of websites would yield more comprehensive information. We additionally understand that our sampling strategy limits the generalizability of the results obtained in this study. Nevertheless, our exploratory study offers a starting point on this timely research topic and delineates some important trends of how both medical and recreational marijuana dispensaries across the USA are currently advertising marijuana online. Given that the marijuana industry is evolving quickly, we recommend that future studies work to expand upon our pilot findings. We eliminated two websites that required a medical marijuana card before looking at the products; the possibility exists that these websites may have been more responsible, and removing these might have skewed our data. Likewise, new dispensary websites are constantly coming out, and these websites are changing frequently, but we could only assess the data up until a certain point in time. Furthermore, examining dispensary advertising practices on their respective websites is only one outlet by which these advertisements may occur online; evaluating popular marijuana websites that market marijuana retailers online (i.e., Weedmaps and Leafly) along with a study of the advertisements on social media platforms would provide a more comprehensive overview of this topic.

Despite limitations, we contribute to an expanding body of knowledge that is important to build upon in the future with regard to improving policy and counter-marketing efforts to reduce or prevent marijuana use-related harms. The present study takes important first steps toward investigating the online advertising practices of dispensaries within both recreational and medical states across the country in order to inform regulations to protect youth and other high-risk populations and against health claims that lack sufficient evidence. Future research should continue the surveillance of marijuana commercialization and online advertising, especially in the context of state policy reforms.

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Compliance with Ethical Standards

Conflict of Interest One of the authors, Dr. Bierut, is listed as an inventor on Issued U.S. Patent 8,080,371, “Markers for Addiction,” covering the use of certain SNPs in determining the diagnosis, prognosis, and treatment of addiction. All other authors declare that they have no conflicts of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent Not applicable. This study did not involve human participants.

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