Exposure to Marijuana Marketing After Legalization of Retail Sales: Oregonians' Experiences, 2015–2016

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Objectives. To assess exposure to marijuana advertising in Oregon after the start of retail marijuana sales in October 2015.

Methods. We conducted a repeated cross-sectional online survey of 4001 Oregon adults aged 18 years and older in November 2015 and April–May 2016. We assessed subgroup differences by using the Pearson χ^2 test.

Results. More than half of adults (54.8%) statewide reported seeing marijuana advertising in the past month. These adults reported that they most frequently saw storefront (74.5%), streetside (66.5%), and billboard (55.8%) advertising. Exposure did not significantly differ by participant's age or marijuana use but was higher among those living in counties with retail sales (56.5%) than in counties without (32.5%).

Conclusions. Most adults reported exposure to marijuana advertising following the start of retail marijuana sales in Oregon. People who do not use marijuana and those aged 18 to 24 years were as exposed to advertising as other groups.

Public Health Implications. Advertising restrictions may be needed to protect youths and young adults from pro-use messages. Commercial free speech afforded by the First Amendment makes advertising restrictions challenging, but public policy experts note that restrictions aimed at protecting youths may be allowed. (*Am J Public Health.* 2018;108:120–127. doi:10.2105/AJPH.2017.304136)

See also Caulkins, p. 20.

After Oregon voters passed Ballot Measure 91 in November 2014, Oregon became 1 of the 4 first states in the United States to legalize retail (also called "recreational" or "nonmedical") marijuana for adults aged 21 years and older. The implementation of marijuana legalization was accomplished in phases: adult possession of less than 1 ounce of marijuana was decriminalized on July 1, 2015, sales of retail marijuana through existing medical marijuana dispensaries began in October 2015, and licensing of retail stores started in October 2016. Because of the concerns about negative effects among users who start during their youth, such as longer-term dependence and acute risks like psychotic symptoms and impaired driving,[1,2] a public health objective for legalized marijuana is minimizing access, availability, and use by youths.

Evidence from tobacco and alcohol markets indicates that advertising exposure is associated with lower risk perceptions and increased use among young people,[3,4] and marijuana advertising could have a similar effect on youths. This is of particular concern because of the declining risk perceptions of marijuana: the percentage of US 12th graders who said it was a "great risk" to smoke marijuana regularly decreased substantially—from 78.6% in 1991 to 31.1% in 2016.[5] In fact, a recent study from California found adolescents' exposure to medical marijuana advertising was significantly associated with a higher probability of marijuana use and stronger intentions to use 1 year later.[6] Early discussions about effective public health approaches for regulating retail marijuana markets identified comprehensive advertising regulations as an important potential approach to limit marijuana initiation among youths on the basis of lessons from tobacco and alcohol control.[7]

Oregon has recently developed rules to regulate the emerging retail marijuana market, including those that address advertising. To date, Oregon's retail marijuana regulations restrict television, radio, billboard, print media, and Internet advertising to locations where no more than 30% of the audience is younger than 21 years and prohibits marijuana advertising containing content that can reasonably be considered to target individuals younger than 21 years, such as images of cartoon characters or toys.[8] Marijuana advertisements are also required to include the following age-related statements: "For use only by adults twenty-one years of age and older" and "Keep out of the reach of children."[8] Oregon prohibits advertising through handbills that are posted or passed out in public areas, such as parking lots and publicly owned property, and limits cell phone–based advertising.[8] Billboards, streetside marketing—including people waving promotional signs—and storefront advertising are allowed.

Although these restrictions did not apply to the medical dispensaries selling retail

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This article was accepted September 9, 2017.

doi: 10.2105/AJPH.2017.304136

marijuana during limited early sales, dispensaries were subject to a previously developed set of rules. At the time of our study, dispensaries selling retail marijuana were required to include the statement "Keep marijuana out of the reach of children" on all advertisements and were restricted from any advertising that contained deceptive, false, or misleading statements; contained content that can reasonably be considered to target minors; made claims that a marijuana item has curative or therapeutic effects unless the claim is supported by the totality of publicly available scientific evidence; or showed consumption of marijuana items.[9]

Because of the recent emergence of a legalized retail market for marijuana products and evolving regulatory systems for that market, public entities considering legalization may be uncertain about how much and what types of marijuana advertising may occur in communities. Although a recent study by Krauss et al. assessed advertising exposure among a national sample of past-month marijuana users aged 18-to-34-years,[10] there has not been documentation of marijuana advertising exposure among the general population in a state with legalized retail marijuana.

We assessed self-reported exposure to marijuana advertising and health risk messages among Oregon adults shortly after the start of limited retail sales of marijuana on October 1, 2015. Absent data on youths' exposure to marijuana advertising, we prioritized assessment among young adults (aged 18–24 years) for insight into potential exposure among younger people. Our results may be useful to characterize the marketing environment and inform advertising regulations.

METHODS

The Oregon Public Health Division administered a repeated cross-sectional online survey to assess a variety of health-related factors (including the use or consumption of tobacco, active transportation, alcohol, sugary drinks, and marijuana) among people aged 18 years or older living in the state of Oregon. Online surveys have been noted as a valuable supplement to existing public health surveillance systems to address gaps in data collection for rare and dispersed populations, rising costs from declining response rates, and the inability to rapidly respond to changing population health and health determinants.[11] Online surveys have also been used to collect nationally representative data on adult marijuana use.[12]

The survey was completed in November 2015 (fall 2015) and again in April to May 2016 (spring 2016). Respondents were randomly selected to participate from a professionally maintained commercial panel vendor, Research Now. Because the panel vendor used nonprobability-based recruitment, sampling quotas for gender, age, education level, and county residency were used to ensure respondent demographics matched those of the Oregon adult population. Respondents were provided a monetary incentive of $5 worth of "eRewards" credits to complete the survey. The survey took approximately 15 minutes (median) to complete. Respondents who provided random, illogical, or inconsistent responses; overused nonresponse options (e.g., "don't know"); completed the survey in less than 30% of the median time to completion ("speeders"); or provided nonsensical answers to open-ended questions were removed from the data. On the basis of these exclusion criteria, 30 (1.5%) and 6 (0.3%) survey respondents were removed from the analytic sample in fall 2015 and spring 2016, respectively. After removing these respondents, there were 2001 adults who completed the survey in the fall 2015 and another 2000 who completed it in the spring 2016. The corresponding response rates were 68.7% and 78.8%, respectively. The sample size for each survey wave was determined on the basis of an allotted budget rather than power calculations.

We combined the data for all respondents from the 2 online surveys to provide adequate sample sizes for assessment of differences between demographic subgroups. A small number of respondents (n = 232) participated in both surveys. For these respondents, we removed the duplicate observation from the 2015 survey to retain the maximum number of 2016 survey responses (because this survey provided more information about respondent age). We weighted the data to match the distribution of Oregon's adult population using iterative proportional fitting (or raking[13]) on the basis of demographic characteristics from the US Census, including age, gender, race/ethnicity, education level, home ownership, marital status, and metro or nonmetro residency.

Measures

We developed survey measures for general advertising and health risk message exposure de novo as we were not aware of any preexisting, validated questions to address these topics. Measures for specific advertising exposure were developed on the basis of existing questions related to tobacco advertising on Oregon's Behavioral Risk Factor Surveillance System (BRFSS) survey.

We assessed exposure to marijuana advertising with the question: "In the last 30 days, how often have you seen or heard advertising for marijuana products or stores in your community (include TV, radio, signs, billboards, newspapers, pamphlets, or streetside marketing)?" Response options included "I have not seen or heard marijuana product advertising in the last 30 days," "A few times in the last 30 days," "Several times in the last 30 days," and "Nearly all of the last 30 days." We assessed exposure to marijuana health risk messages with the question: "In the last 30 days, how often have you seen or heard anything about the health risks of marijuana use (include TV, radio, signs, billboards, newspapers, and pamphlets)?" Response options included "I have not seen or heard marijuana health risk messages in the last 30 days," "A few times in the last 30 days," "Several times in the last 30 days," and "Nearly all of the last 30 days."

The following questions about types of advertising exposure were added in the spring 2016 survey: "In the last 30 days, have you seen or heard advertising for marijuana products or stores in your community . . . on the radio; on billboards; in a magazine or newspaper; on streetside marketing, like sandwich boards; on storefronts; in pamphlets or flyers; on signs being held by people on sidewalks (sign wavers); online, on your cell phone, tablet, or computer (through email, websites, or social media); at an outdoor event, like a concert, fair, rodeo, parade, or similar event?" We randomized these questions so that each respondent was asked half of them.

We assessed marijuana use history with the question: "Which statement best describes your history of marijuana or cannabis use?

(this includes marijuana use in any form: smoking, edibles, vaping, etc.)." Response options included "never used," "tried it once or twice," "used occasionally or socially," "regularly used for at least 6 months at any time in the past," and "used every day for at least a month at any time in the past." We assessed current marijuana use with the question: "During the last 30 days, on how many days did you use marijuana?" We considered respondents indicating at least 1 day of marijuana use in the past 30 days current users. We categorized respondents as former users or experimenters if they indicated ever using marijuana in the past, but not in the past 30 days.

We assessed gender, age, education, home ownership, race/ethnicity, and marital status using questions consistent with the state BRFSS.[14] We assigned metro area residence (living in the state's 5 most urban counties vs outside those counties) according to respondents' self-reported county of residence. We assessed self-reported exposure to marijuana markets with the question "Is there a dispensary or store that sells marijuana in your neighborhood?" In addition, we used self-reported county of residence and the Oregon Medical Marijuana Program's Medical Marijuana Dispensary Directory[15] to determine if the respondent was living in a county with a medical marijuana dispensary participating in early retail marijuana sales during the periods in which the online surveys took place (fall 2015 and spring 2016).

Data Analysis

We weighted all reported prevalence estimates to represent the Oregon adult population. We used the Pearson χ^2 test at the .05 level of significance to determine whether participant demographic characteristics or presence of marijuana markets were associated with general exposure to marijuana advertising and health risk messages. We conducted all analyses using Stata version 13.0.[16]

RESULTS

Respondent demographics are shown in Table 1.

More than half of adults (54.8%) reported seeing or hearing advertising for

TABLE 1—Characteristics of Survey Respondents in Online Surveys: Oregon, Fall 2015 and Spring 2016

Characteristic	Sample Size, No.	Weighted[a] % (95% CI)
Total	3885	
Gender (n = 3885)		
Male	1494	49.0 (46.6, 51.4)
Female	2380	50.6 (48.2, 53.0)
Transgender	11	0.4 (0.2, 0.9)
Age groups (n = 3885), y		
18–24	322	11.9 (9.9, 14.3)
25–34	617	17.4 (15.5, 19.4)
35–54	1230	33.1 (30.9, 35.4)
55–64	768	17.5 (16.1, 19.0)
≥ 65	948	20.1 (18.7, 21.6)
Race/ethnicity (n = 3845[b])		
Non-Hispanic White	3385	79.9 (77.3, 82.3)
Non-Hispanic African American	39	1.7 (1.2, 2.5)
Non-Hispanic American Indian/Alaska Native	42	4.3 (3.0, 6.1)
Non-Hispanic Asian	157	1.9 (1.4, 2.7)
Non-Hispanic multiple races	49	2.0 (1.4, 2.9)
Hispanic	173	10.2 (8.3, 12.4)
Education level (n = 3885)		
< high school graduate	77	11.2 (8.9, 14.1)
High school graduate or GED	803	25.4 (23.4, 27.5)
Some college	1607	35.2 (34.2, 38.3)
College graduate	1398	27.2 (25.4, 29.0)
Home ownership (n = 3885)		
Own	2466	64.0 (61.5, 66.4)
Rent	1161	28.0 (25.6, 30.0)
Other arrangement	238	7.6 (5.8, 9.2)
Don't know	20	0.9 (0.4, 1.8)
Marital status (n = 3885)		
Married or domestic partnership	2213	52.8 (50.4, 55.2)
Never married	1075	25.7 (23.6, 28.0)
Divorced, widowed, separated	597	21.5 (19.5, 23.6)
Metro resident (n = 3885)		
Metro area resident	2095	52.6 (50.2, 55.0)
Not metro area resident	1790	47.4 (45.0, 49.8)
Marijuana use status (n = 3885)		
Never user	1499	35.7 (33.5, 37.8)
Former user or experimenter	1668	42.9 (40.6, 45.3)
Current user	718	21.4 (19.3, 23.7)
Marijuana store in neighborhood (self-report; n = 3885)		
Yes	1323	34.0 (31.8, 36.3)
No	1940	49.9 (47.6, 52.3)
Don't know	622	16.1 (14.3, 18.0)

Continued

TABLE 1—*Continued*

Characteristic	Sample Size, No.	Weighted[a] % (95% CI)
Presence of marijuana store (registered dispensary; n = 3885)		
Yes	3648	92.9 (91.3, 94.2)
No	237	7.1 (5.8, 8.7)

Note. CI = confidence interval; GED = general education diploma. Online surveys were conducted in November 2015 and April–May 2016.

[a]Data were weighted on the following factors: gender, age, race/ethnicity, education level, home ownership, marital status, and metro area residency.

[b]Race/ethnicity was missing for 40 respondents.

marijuana products or stores in the past 30 days (Table 2). Three in 10 adults (29.6%) reported exposure to marijuana advertising "a few times" in the past 30 days, 17.8% reported "several times," and 7.4% reported "nearly every day." Among those who reported exposure to marijuana advertising in 2016, the most reported advertising types were storefronts (74.5%), streetside marketing like sandwich boards (66.5%), billboards (55.8%), magazines or newspapers (40.2%), and sign wavers on sidewalks (29.3%). Examples of advertising content are shown in Figure 1 (color photos of advertising content are shown in Figure A, available as a supplement to the online version of this article at http://www.ajph.org).

TABLE 2—Past-Month Exposure to Marijuana Advertising and Health Risk Messages Among Adults in Online Surveys: Oregon, Fall 2015 and Spring 2016

	Weighted[a] % (95% CI)
Exposure to marijuana advertising (n = 3885), in the past 30 d	
Have not seen or heard marijuana advertising	45.2 (42.9, 47.6)
Have seen or heard marijuana advertising	54.8 (52.4, 57.1)
A few times	29.6 (27.5, 31.9)
Several times	17.8 (16.1, 19.5)
Nearly all	7.4 (6.1, 8.9)
Type of marijuana advertising among those exposed to advertising (n = 580)[b]	
On storefronts	74.5 (68.6, 79.6)
On streetside marketing, like sandwich boards	66.5 (59.7, 72.7)
On billboards	55.8 (48.7, 62.7)
In a magazine or newspaper	40.2 (33.2, 47.5)
On signs being held by people on sidewalks (sign wavers)	29.3 (24.0, 35.2)
On radio	24.4 (18.7, 31.1)
In pamphlets or flyers	22.5 (17.4, 28.7)
Online on cell phone, tablet, or computer (through e-mail, Web sites, or social media)	21.8 (16.6, 28.0)
On television	21.1 (15.0, 27.9)
At an outdoor event, like a concert, fair, rodeo, parade, or similar event	16.3 (11.8, 22.1)
Exposure to marijuana health risk messages (n = 3885), in the last 30 d	
Have not seen or heard marijuana health risk messages	71.7 (69.4, 73.8)
Have seen or heard marijuana health risk messages	28.3 (26.2, 30.6)
A few times	20.4 (18.6, 22.3)
Several times	6.4 (5.1, 8.1)
Nearly all	1.5 (0.9, 2.4)

Note. CI = confidence interval. Online surveys were conducted in November 2015 and April–May 2016.

[a]Data were weighted on the following factors: gender, age, race/ethnicity, education level, home ownership, marital status, and metro area residency.

[b]Questions on type of advertising exposure were asked randomly among a split sample of survey respondents on the spring 2016 survey.

About one quarter of adults (28.3%) reported seeing or hearing messages about the health risks of marijuana in the past 30 days. Two in 10 adults (20.4%) reported exposure to marijuana health risk messages "a few times" in the past 30 days, 6.4% reported "several times," and 1.5% reported "nearly every day."

More than half (52.1%) of young adults (aged 18–24 years) reported exposure to marijuana advertising, which was not significantly different from other age groups. The spring 2016 survey was modified to specifically ask if respondents were aged 18 to 20 years; advertising awareness among this small group (n = 42) was statistically similar to awareness among those aged 21 to 24 years (63.2% for those aged 18–20 years compared with 57.3% for those aged 21–24 years in 2016 only; data not shown). Exposure to any marijuana advertising in the past month did not significantly differ by participant gender, race/ethnicity, highest level of education completed, home ownership, residence in a metro area, or marijuana use (Table 3). Exposure to marijuana advertising was significantly higher among adults in married or domestic partnerships (57.5%) compared with divorced, widowed, or separated adults (47.2%). Exposure to advertising was significantly higher among people who said they had a marijuana store in their neighborhood (63.4%) compared with those who said they did not have a store in their neighborhood (52.9%) or did not know if they had a neighborhood store (42.4%).

Exposure was significantly higher among people living in counties where the presence of retail marijuana sales was objectively determined using mapped dispensary location data. More than half (56.5%) of people in counties with retail sales reported exposure to marijuana advertising compared with 32.5% of people in counties without retail sales.

DISCUSSION

During early retail marijuana sales in Oregon, more than half of survey respondents statewide reported exposure to advertising for marijuana products or stores in the past month. Advertising for marijuana products or stores was not limited to those who use marijuana, and exposure remained consistent

FIGURE 1—Marijuana Store and Product Advertising in Oregon Showing (a) Storefront With Signage Associating Marijuana With Wellness, (b) Streetside Marketing With Cartoon Owl, (c) Billboard Associating Marijuana With Outdoor Recreation, (d) Billboard Advertising Free Bong With Purchase of Marijuana, (e) Placard for Marijuana-Related Feature Story in Local Newspaper Associating Marijuana With Girl Scout Cookies, (f) Billboard Advertising Marijuana Dabs, and (g) Sign Waver Advertising Retail Marijuana Outside a Dispensary: Oregon, 2015–2017

(at or above 45%) across age and other demographic subgroups, suggesting that the potential influence of this advertising will not be limited to specific groups of people.

Although this survey assessed exposure among adults, the mass-reach traditional advertising (e.g., television, radio) and advertisements occurring outside retail stores (e.g., billboards, sidewalk signs) would likely be highly visible to youths as well. Indeed, most people aged 18 to 24 years (including those aged 18–20 years who are not legally able to purchase or possess retail marijuana) reported seeing marijuana advertising as often as other age groups. These highly visible, outdoor advertising types (e.g., billboards, sign wavers) were not assessed in the national study of young adult marijuana users by Krauss et al.[10] and may be more relevant in places with legal marijuana markets. Frequency of advertising exposure is an important consideration as well; future analyses with larger sample sizes will explore differences in how often demographic subgroups see advertisements.

Although marijuana advertising exposure was lower in Oregon counties that did not currently have legal marijuana sales outlets (perhaps because of community-level bans, which are allowed in Oregon[17]), nearly one third of adults in counties without marijuana outlets still reported seeing marijuana advertising in the past month. Although we are not able to distinguish whether the ads they saw were a result of travel to places where marijuana sales are occurring or of print and other ads "bleeding" into border areas, this finding suggests that the presence of marijuana markets and associated advertising may affect people living in adjacent communities.

Our study found limited exposure to marijuana health risk messages among adults in Oregon. Nearly 5 times as many adults overall reported near daily exposure to marijuana advertising (7.4%) compared with health risk messages (1.5%). However, during the time of this study the only health risk messages being broadly implemented were 3 posters required at the point of sale about preventing child poisonings, use during pregnancy, and impaired driving.[8] In addition to health risk messages, evidence from tobacco prevention strongly supports countermarketing campaigns to limit the influence of product advertising.[18] Indeed, marijuana countermarketing among high-risk youths has been found to reduce upward trends in current marijuana use.[19]

If states act to legalize retail or medical marijuana sales, marketing may also become more acceptable and more prevalent in the absence of regulations to limit it. Public sentiment continues to trend favorably toward marijuana legalization: as of October 2016, 60% of US adults believe marijuana use should be legal (although this does not necessarily imply support of a legal sales market).[20] This suggests that marketing may also become more acceptable and more prevalent. The American Public Health Association has identified regulation of retail marijuana as a public health priority and urges federal, state, and local government to limit and restrict advertising.[21] Although commercial free speech afforded by the First Amendment makes advertising restrictions challenging, tobacco policy experts present it as a legal "gray area,"[22] and the American Public Health Association notes that restrictions aimed at adolescents and children rather than adults would likely be allowed.[21]

In considering the potential design of marketing restrictions, Pacula et al. recommend a comprehensive approach that covers advertising (e.g., print, transit, billboard, television) and promotion (e.g., price discounting, coupons, free samples) on the basis of experiences from tobacco control, in which industry marketing expenditures shifted to less regulated advertising and promotion formats over time.[7] States with legalization have been quick to ban some types of promotions that directly encourage use; for example, Washington State, Colorado, and Oregon have all set limits on providing free or discounted marijuana products to the general public.[8,23,24] It is also important to consider the role of monitoring and enforcement of any policies to restrict advertising. For example, Oregon and Colorado allow marijuana advertising only through media channels when less than 30% of the audience is younger than 21 years,[8,24] which is higher than prevention recommendations for a 15% maximum youth audience when advertising adult products in mass media.[25] However, regardless of the specific threshold, there is no clear description of how audiences are identified or what entity bears the burden of proof for ensuring that advertising is allowed.

Limitations

There were several limitations to this study. First are limitations inherent to using online surveys with an established panel, including the potential for respondent fraud and response bias to receive survey incentives (i.e., indicating a certain behavior or demographic characteristic to qualify for the survey). Because of the nature of an online survey, the sample is also limited to those with Internet access, which could introduce demographic biases associated with differential use and access to Internet among certain populations. Panel participants were selected through online partnership organizations (e.g., online shoppers), rather than probabilistic methods that ensure representativeness. To account for potential differences between our sample and the general population, we used a poststratification weight in our analyses on the basis of the known Oregon adult distribution of key demographic factors; however, it is possible that this adjustment did not completely control for unobservable

TABLE 3—Exposure to Marijuana Advertising by Characteristics of Respondents in Online Surveys: Oregon, Fall 2015 and Spring 2016

Characteristic	Exposed to Marijuana Advertising, Weighted[a] % (95% CI)	*P*[b]
Total	54.8 (52.4, 57.1)	
Gender (n = 3874)[c]		.73
Male	55.2 (51.4, 58.8)	
Female	54.3 (51.3, 57.3)	
Age group (n = 3885), y		.08
18–24	52.1 (41.8, 62.2)	
25–34	57.0 (50.7, 63.0)	
35–54	58.8 (54.8, 62.7)	
55–64	53.8 (49.5, 58.0)	
≥ 65	48.7 (45.2, 52.3)	
Race/ethnicity (n = 3845)[d]		.60
Non-Hispanic White	54.2 (51.9, 56.5)	
Non-Hispanic African American	45.3 (27.4, 64.6)	
Non-Hispanic American Indian/Alaska Native	56.9 (38.3, 73.7)	
Non-Hispanic Asian	45.8 (29.6, 62.9)	
Non-Hispanic multiple races	70.3 (51.4, 84.1)	
Hispanic	55.0 (43.9, 65.6)	
Education level (n = 3885)		.16
< high school graduate	56.1 (43.1, 68.3)	
High school graduate or GED	51.6 (47.0, 56.2)	
Some college	52.6 (49.5, 55.6)	
College graduate	60.1 (56.7, 63.4)	
Home ownership (n = 3865)[e]		.32
Own	56.5 (53.8, 59.1)	
Rent	51.9 (47.1, 56.7)	
Other arrangement	51.7 (39.8, 63.4)	
Marital status (n = 3885)		.01
Married or domestic partnership	57.5 (54.7, 60.4)	
Never married	55.4 (50.2, 60.6)	
Divorced, widowed, separated	47.2 (41.8, 52.7)	
Metro resident (n = 3885)		.08
Metro area resident	56.8 (53.6, 59.9)	
Not metro area resident	52.6 (49.0, 56.1)	
Marijuana use status (n = 3885)		.39
Never user	53.0 (49.4, 56.5)	
Former user or experimenter	54.9 (51.3, 58.4)	
Current user	57.6 (51.6, 63.5)	
Marijuana store in neighborhood (self-report; n = 3885)		< .001
Yes	63.4 (59.4, 67.3)	
No	52.9 (49.6, 56.1)	
Don't know	42.4 (36.1, 48.9)	

Continued

TABLE 3—*Continued*

Characteristic	Exposed to Marijuana Advertising, Weighted[a] % (95% CI)	*P*[b]
Presence of marijuana store (registered dispensary; n = 3885)		< .001
Yes	56.5 (54.1, 58.9)	
No	32.5 (24.2, 42.0)	

Note. CI = confidence interval; GED = general education diploma. Online surveys were conducted in November 2015 and April–May 2016.

[a]Data were weighted on the following factors: gender, age, race/ethnicity, education level, home ownership, marital status, and metro area residency.

[b]*P* value on the basis of Pearson χ^2 comparing exposure to marijuana advertising across subgroups.

[c]Removed responses of "transgender" (n = 11) for analysis because of small sample size.

[d]Race/ethnicity was missing for 40 respondents.

[e]Removed "don't know" responses from denominator for analysis (n = 19).

differences between the population of online panel participants and the general population.

Second, awareness of marijuana advertising may have been enhanced because this is a new and politically charged topic, and awareness may diminish over time because of the norming of retail marijuana and associated advertising rather than actual changes in the amount of advertising. Lastly, our data were collected during a transitional period of retail legalization when only existing, registered medical marijuana dispensaries were allowed to begin sales (and advertising) for nonmedical products. We do not have baseline (pre-2015) data on marijuana advertising exposure, but more importantly, our findings may underestimate the presence of marijuana advertising after the full retail market opened in October 2016, when a greater number of retail stores (and associated advertising) would be expected.

Public Health Implications

To our knowledge, this is the first study to assess advertising exposure among the general adult population in a state with legalized retail marijuana. Our results confirm that exposure to marijuana advertising will be prevalent following legalization of retail marijuana, absent strong regulations to restrict it. Our results also suggest that marijuana advertising may reach and influence border communities even if they have not legalized marijuana, and be seen by most groups of people, including people younger than 21 years and those who do not use marijuana. Because of the positive association between industry marketing and youths' tobacco and alcohol use, advertising exposure will likely increase the appeal of marijuana for youths.

In November 2016, 4 more states—California, Massachusetts, Maine, and Nevada—legalized retail marijuana sales through voter-approved ballot initiatives. Our study provides a glimpse into the advertising environment that these states can expect and supports careful consideration of advertising restrictions during early regulatory discussions. Although retail marijuana is in its relative infancy, states early to legalize have an opportunity to draw from lessons in tobacco and alcohol prevention and set standards for regulation that protect youths from pro-use messaging. AJPH

CONTRIBUTORS

S. C. Fiala assisted with data collection and led the data analysis. S. C. Fiala and J. A. Dilley wrote the article. J. A. Dilley supervised the study. C. L. Firth contributed to data analysis and reviewed the article. J. E. Maher contributed to interpretation of the results and reviewed the article.

ACKNOWLEDGMENTS

Research reported in this article was supported by the National Institute on Drug Abuse (NIDA) of the National Institutes of Health under award number 1R01DA039293, and by the Oregon Public Health Division. We wish to thank the Health Promotion and Chronic Disease Prevention (HPCDP) section of the Oregon Public Health Division for funding data collection.

We thank Duyen Ngo and Beth Vorderstrasse in the HPCDP section for leading overall online survey development and administration. We also wish to thank Katrina Hedberg of the Oregon Public Health Division and Beau Kilmer of the RAND Corporation for their critical review of the article.

Note. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

HUMAN PARTICIPANT PROTECTION

Data collection for this study was conducted as public health practice and was exempt from approval by the institutional review board of the Oregon Public Health Division. All authors have complied with the Principles of the Ethical Practice of Public Health of the American Public Health Association.

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