

Exposure to marijuana marketing after legalization of retail sales: Oregonians' experiences, 2015-2016

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

34
35 *Methods.* We conducted a repeated cross-sectional online survey of 4,001 Oregon adults age 18
36 years and older in November 2015 and April-May 2016. Subgroup differences were assessed
37 using Pearson chi square tests.

38
39 *Results.* More than half of adults (54.8%) statewide reported seeing marijuana advertising in the
40 past month. These adults reported storefronts (74.5%), streetside marketing (66.5%), and
41 billboards (55.8%) were most frequently seen. Exposure did not significantly differ by
42 participant's age or marijuana use, but was higher among those living in counties with retail sales
43 (56.5%) than in counties without (32.5%).

44
45 *Conclusions.* Most adults reported exposure to marijuana advertising following the start of retail
46 marijuana sales in Oregon. People who do not use marijuana and young people 18-24 years old
47 were as exposed to advertising as other groups.

48
49 *Policy Implications.* Advertising restrictions may be needed to protect youth and young adults
50 from pro-use messages. Commercial free speech afforded by the First Amendment makes
51 advertising restrictions challenging, but public policy experts note that restrictions aimed at
52 protecting youth may be allowed.

After Oregon voters passed Ballot Measure 91 in November 2014, Oregon became one of four first states in the United States (U.S.) to legalize retail (also called recreational or non-medical) marijuana for adults 21 years and older. Implementation of marijuana legalization was accomplished in phases: adult possession of less than one 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. Given the concerns about negative effects among users who start during 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 youth.

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 youth. This is of particular concern given the declining risk perceptions of marijuana: the percent of youth who said it was a “great risk” to smoke marijuana regularly decreased substantially from 78.6% in 1991 to 31.1% in 2016 among U.S. 12th graders.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 one 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 youth based on lessons from tobacco and alcohol control.⁷

Oregon has recently developed rules to regulate the emerging retail marijuana market, including those to 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 under 21 years old, and prohibits marijuana advertising containing content that can reasonably be considered to target individuals under 21 years old, 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 cellphone-based

advertising.⁸ Billboards, streetside marketing - including people waving promotional signs - and storefront advertising are allowed.

While these restrictions did not apply to the medical dispensaries selling retail marijuana during limited early sales, dispensaries were subject to a previously-developed set of rules. At the time of this 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; and shows consumption of marijuana items.⁹

Given 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. While a recent study by Krauss, et al. assessed advertising exposure among a national sample of past-month marijuana users in the 18-34-year-old age group,¹⁰ there has not been documentation of marijuana advertising exposure among the general population in a state with legalized retail marijuana.

The objective of this study was to assess 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 youth exposure to marijuana advertising, we prioritized assessment among young adults (18-24 years old) for insight into potential exposure among younger people. Results from this study may be useful to characterize the marketing environment and inform advertising regulations.

METHODS

Data Source

The Oregon Public Health Division administered a repeated cross-sectional online survey to assess a variety of health-related factors (including tobacco, active transportation, alcohol, sugary drinks and marijuana) among people age 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 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-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 sex, 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 non-response option (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. Based on these exclusion criteria, n = 30 (1.5%) and n= 6 (0.3%) survey respondents were removed from the analytic sample in fall 2015 and spring 2016, respectively. After removing these respondents, there were 2,001 adults who completed the survey in the fall 2015 and another 2,000 who completed it in the spring 2016. The corresponding response rates were 68.7% and 78.8%. The sample size for each survey wave was based on an allotted budget rather than power calculations.

Data for all respondents from the two online surveys were combined 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, the duplicate observation from the 2015 survey was removed to retain the maximum number of 2016 survey responses (because this survey provided more information about respondent age). Data were weighted to match the distribution of Oregon’s adult population using iterative proportional

fitting (or raking¹³) based on demographic characteristics from the U.S. Census, including age, sex, race and ethnicity, education level, home ownership, marital status, and metro or non-metro residency.

Measures

Survey measures for general advertising and health risk message exposure were developed de novo as we were not aware of any pre-existing, validated questions to address these topics.

Measures for specific advertising exposure were based on existing questions related to tobacco advertising on Oregon's Behavioral Risk Factor Surveillance System (BRFSS) survey.

General advertising exposure. Exposure to marijuana advertising was assessed 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, billboard, newspaper, pamphlets, or streetside marketing)?" Response options included "I have not seen or heard marijuana product advertising in the past 30 days", "A few times in the past 30 days", "Several times in the last 30 days", and "Nearly all of the last 30 days."

Health risk message exposure. Exposure to marijuana health risk messages was assessed with the question: "In the past 30 days, how often have you seen or heard anything about the health risks of marijuana use (include TV, radio, signs, billboard, newspaper, and pamphlets)?" Response options included "I have not seen or heard marijuana health risk messages in the past 30 days", "A few times in the past 30 days", "Several times in the last 30 days", and "Nearly all of the last 30 days."

Specific advertising exposure. 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 cellphone, tablet, or computer (through email, websites, or social media); at an outdoor event, like a concert, fair,

185 rodeo, parade, or similar event?” These questions were randomized so that each respondent was
186 asked half of them.

187
188 *Marijuana use.* Marijuana use history was assessed with the question: “Which statement best
189 describes your history of marijuana or cannabis use? (this includes marijuana use in any form:
190 smoking, edibles, vaping, etc.)”. Response options included “never used”, “tried it once or
191 twice”, “used occasionally or socially”, “regularly used for at least 6 months at any time in the
192 past”, and “used every day for at least a month at any time in the past”. Current marijuana use
193 was assessed with the question: “During the past 30 days, on how many days did you use
194 marijuana?” Respondents indicating at least one day of marijuana use in the past 30 days were
195 considered current users. Respondents were categorized as former users/experimenters if they
196 indicated ever using marijuana in the past, but not in the past 30 days.

197
198 *Demographic characteristics.* Sex, age, education, home ownership, race and ethnicity, and
199 marital status were assessed using questions consistent with the state Behavioral Risk Factor
200 Surveillance System (BRFSS).¹⁴ Metro area residence (living in the state’s five most urban
201 counties vs. outside those counties) was assigned according to respondents’ self-reported county
202 of residence.

203
204 *Community presence of marijuana markets.* Self-reported exposure to marijuana markets was
205 assessed with the question: “Is there a dispensary or store that sells marijuana in your
206 neighborhood?” In addition, we used self-reported county of residence and the Oregon Medical
207 Marijuana Program’s Medical Marijuana Dispensary Directory¹⁵ to determine if the respondent
208 was living in a county with a medical marijuana dispensary participating in early retail marijuana
209 sales during the time periods in which the online surveys took place (fall 2015 and spring 2016).

210 211 **Data Analysis**

212 All reported prevalence estimates were weighted to represent the Oregon adult population. We
213 used Pearson chi-square tests at the .05 level of significance to determine whether participant
214 demographic characteristics or presence of marijuana markets were associated with general

exposure to marijuana advertising and health risk messages. All analyses were conducted 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 marijuana products or stores in the past 30 days (Table 2). Three-in-ten 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 exposure “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 available online).

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-ten 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 (ages 18-24) reported exposure to marijuana advertising, which was not significantly different than other age groups. The spring 2016 survey was modified to specifically ask if respondents were ages 18-20; advertising awareness among this small group (n = 42) was statistically similar to those aged 21-24 years (63.2% for 18-20 year olds compared to 57.3% for 21-24 year olds in 2016 only, data not shown). Exposure to any marijuana advertising in the past month did not significantly differ by participant sex, race and ethnicity, highest level of education completed, home ownership, residence in the metro area, or by marijuana use (Table 3). Exposure to marijuana advertising was significantly higher among adults in married/domestic partnerships (57.5%) compared to divorced, widowed or separated adults (47.2%); however, this difference was no longer significant after adjusting for respondent age (data not shown). Exposure to advertising was significantly higher among people who said

they had a marijuana store in their neighborhood (63.4%) compared to those who said they did not have a store in their neighborhood (52.9%) or didn't know if they had a neighborhood store (42.4%).

Exposure was significantly higher among people who live in counties where presence of retail marijuana sales was objectively determined using mapped dispensary location data. Over half (56.5%) of people in counties with retail sales reported exposure to marijuana advertising compared to 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 any 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 (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.

While 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 youth as well. Indeed, most people ages 18-24 years (including 18-20 year olds 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. 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 do not currently have legal marijuana sales outlets (perhaps because of community-level bans which are allowed in Oregon¹⁷), nearly one-third of adults in counties without marijuana outlets still reported seeing

marijuana advertising in the past month. While 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 five times as many adults overall reported near daily exposure to marijuana advertising (7.4%) compared to health risk messages (1.5%). However, during the time of this study the only health risk messages being broadly implemented were three 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 counter-marketing campaigns to limit the influence of product advertising.¹⁸ Indeed, marijuana counter-marketing among high-risk youth 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 “grey area”,²² and the American Public Health Association notes that restrictions aimed at adolescents and children rather than adults would likely be allowed.¹⁷

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) based on experiences from tobacco control, where 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 banned providing free samples and coupons 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 only allow marijuana advertising through media channels when less than 30% of the audience is younger than 21 years of age,^{8,20} which is higher than some 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 assuring 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). Due to 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 to ensure representativeness. To account for potential differences between our sample and the general population, we used a post-stratification weight in our analyses based on the known Oregon adult distribution of key demographic factors; however it is possible that this adjustment did not completely control for unobservable differences between the population of online panel participants and the general population.

Second, awareness of marijuana advertising may have been enhanced given this is a new and politically charged topic, and awareness may diminish over time due to 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 dispensaries were allowed to begin sales (and advertising) for non-medical 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 opens in October 2016 when a greater number of retail stores (and associated advertising) would be expected.

PUBLIC HEALTH IMPLICATIONS

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 under the age of 21 and those who do not use marijuana. Given the positive association between industry marketing and youth tobacco and alcohol use, advertising exposure will likely increase the appeal of marijuana for youth.

In November 2016, four more states - California, Massachusetts, Maine, and Nevada - legalized retail marijuana sales through voter-approved ballot initiatives. This study provides a glimpse into the advertising environment that these states can expect, and supports careful consideration of advertising restrictions during early regulatory discussions. While 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 youth from pro-use messaging.

Acceptance date: 09/09/2017

CONTRIBUTORS

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

All authors have complied with the Principles of the Ethical Practice of Public Health of APHA.

ACKNOWLEDGMENTS

We wish to thank the National Institutes of Health (NIH), National Institute on Drug Abuse (NIDA) Project for funding this study (grant 1R01DA039293-01A1).

We wish to thank the Health Promotion and Chronic Disease Prevention Section of the Oregon Public Health Division for funding data collection. 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.

The authors have no conflicts of interest to disclose.

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.

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TABLE 1--Characteristics of Survey Respondents in Fall 2015 and Spring 2016
Panel Surveys^a

Characteristic	Sample size (n)	Weighted ^b % (95% CI)
Total	3,885	
Sex (n = 3,885)		
Male	1,494	49.0 (46.6, 51.4)
Female	2,380	50.6 (48.2, 53.0)
Transgender	11	0.4 (0.2, 0.9)
Age groups (n = 3,885)		
18-24 years old	322	11.9 (9.9, 14.3)
25-34 years old	617	17.4 (15.5, 19.4)
35-54 years old	1,230	33.1 (30.9, 35.4)
55-64 years old	768	17.5 (16.1, 19.0)
65 years old or older	948	20.1 (18.7, 21.6)
Race and ethnicity (n = 3,845 ^c)		
White, NH	3,385	79.9 (77.3, 82.3)
African American, NH	39	1.7 (1.2, 2.5)
American Indian or Alaska Native, NH	42	4.3 (3.0, 6.1)
Asian, non-Hispanic	157	1.9 (1.4, 2.7)
Multiple races, NH	49	2.0 (1.4, 2.9)
Hispanic	173	10.2 (8.3, 12.4)
Education level (n = 3,885)		
Less than HS graduate	77	11.2 (8.9, 14.1)
HS graduate or GED	803	25.4 (23.4, 27.5)
Some college	1,607	35.2 (34.2, 38.3)
College graduate	1,398	27.2 (25.4, 29.0)
Home ownership (n = 3,885)		
Own	2,466	64.0 (61.5, 66.4)
Rent	1,161	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 = 3,885)		
Married or domestic partnership	2,213	52.8 (50.4, 55.2)
Never married	1,075	25.7 (23.6, 28.0)
Divorced, widowed, separated	597	21.5 (19.5, 23.6)
Metro resident (n = 3,885)		
Metro area resident	2,095	52.6 (50.2, 55.0)
Not Metro area resident	1,790	47.4 (45.0, 49.8)
Marijuana use status (n = 3,885)		
Never user	1,499	35.7 (33.5, 37.8)
Former user/experimenter	1,668	42.9 (40.6, 45.3)

Current user	718	21.4 (19.3, 23.7)
Marijuana store in neighborhood (self-report) (n = 3,885)		
Yes	1,323	34.0 (31.8, 36.3)
No	1,940	49.9 (47.6, 52.3)
Don't know	622	16.1 (14.3, 18.0)
Presence of marijuana store (registered dispensary) (n = 3,885)		
Yes	3,648	92.9 (91.3, 94.2)
No	237	7.1 (5.8, 8.7)

Note. CI = confidence interval; NH = non-Hispanic; HS = high school; GED = General Education Diploma

^aPanel surveys were conducted in November 2015 and April-May 2016.

^bData were weighted on the following factors: sex, age, race and ethnicity, education level, home ownership, marital status and metro area residency.

^cRace and ethnicity was missing for 40 respondents.

TABLE 2--Past Month Exposure to Marijuana Advertising and Health Risk Messages Among Oregon Adults in Fall 2015 and Spring 2016 Panel Surveys^a

	Weighted ^b % (95% CI)
Exposure to marijuana advertising (n = 3,885)	
Have not seen or heard marijuana advertising in the past 30 days	45.2 (42.9, 47.6)
Have seen or heard marijuana advertising in the past 30 days	54.8 (52.4, 57.1)
A few times in the last 30 days	29.6 (27.5, 31.9)
Several times in the last 30 days	17.8 (16.1, 19.5)
Nearly all of the last 30 days	7.4 (6.1, 8.9)
Type of marijuana advertising among those exposed to advertising (n = 580) ^c	
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 cellphone, tablet, or computer (through email, websites, 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 = 3,885)	
Have not seen or heard marijuana health risk messages in the past 30 days	71.7 (69.4, 73.8)
Have seen or heard marijuana health risk messages in the past 30 days	28.3 (26.2, 30.6)
A few times in the last 30 days	20.4 (18.6, 22.3)
Several times in the last 30 days	6.4 (5.1, 8.1)
Nearly all of the last 30 days	1.5 (0.9, 2.4)

Note. CI = confidence interval

^aPanel surveys were conducted in November 2015 and April-May 2016.

^bData were weighted on the following factors: sex, age, race and ethnicity, education level, home ownership, marital status and metro area residency.

^cQuestions on type of advertising exposure were asked randomly among a split sample of survey respondents on the spring 2016 survey.

TABLE 3--Exposure to Marijuana Advertising by Characteristics of Survey Respondents in Fall 2015 and Spring 2016 Panel Surveys^a

Characteristic	Exposed to marijuana advertising, weighted ^b % (95% CI)	<i>P</i> value ^c
Total	54.8 (52.4, 57.1)	
Sex (n = 3,874 ^d)		
Male	55.2 (51.4, 58.8)	0.73
Female	54.3 (51.3, 57.3)	
Age groups (n = 3,885)		
18-24 years old	52.1 (41.8, 62.2)	0.08
25-34 years old	57.0 (50.7, 63.0)	
35-54 years old	58.8 (54.8, 62.7)	
55-64 years old	53.8 (49.5, 58.0)	
65 years old or older	48.7 (45.2, 52.3)	
Race and ethnicity (n = 3,845 ^e)		
White, NH	54.2 (51.9, 56.5)	0.60
African American, NH	45.3 (27.4, 64.6)	
American Indian or Alaska Native, NH	56.9 (38.3, 73.7)	
Asian, non-Hispanic	45.8 (29.6, 62.9)	
Multiple races, NH	70.3 (51.4, 84.1)	
Hispanic	55.0 (43.9, 65.6)	
Education level (n = 3,885)		
Less than HS graduate	56.1 (43.1, 68.3)	0.16
HS 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 = 3,865 ^f)		
Own	56.5 (53.8, 59.1)	0.32
Rent	51.9 (47.1, 56.7)	
Other arrangement	51.7 (39.8, 63.4)	
Marital status (n = 3,885)		
Married or domestic partnership	57.5 (54.7, 60.4)	0.01
Never married	55.4 (50.2, 60.6)	
Divorced, widowed, separated	47.2 (41.8, 52.7)	
Metro resident (n = 3,885)		
Metro area resident	56.8 (53.6, 59.9)	0.08
Not Metro area resident	52.6 (49.0, 56.1)	
Marijuana use status (n = 3,885)		
Never user	53.0 (49.4, 56.5)	0.39
Former user/experimenter	54.9 (51.3, 58.4)	
Current user	57.6 (51.6, 63.5)	

Marijuana store in neighborhood (self-report) (n = 3,885)			
Yes	63.4 (59.4, 67.3)		
No	52.9 (49.6, 56.1)		
Don't know	42.4 (36.1, 48.9)		<0.001
Presence of marijuana store (registered dispensary) (n = 3,885)			
Yes	56.5 (54.1, 58.9)		
No	32.5 (24.2, 42.0)		<0.001

Note. CI = confidence interval; NH = non-Hispanic; HS = high school; GED = General Education Diploma

^aPanel surveys were conducted in November 2015 and April-May 2016.

^bData were weighted on the following factors: sex, age, race and ethnicity, education level, home ownership, marital status and metro area residency.

^c*P* value based on Pearson Chi-Square comparing exposure to marijuana advertising across subgroups.

^dRemoved responses of "Transgender" (n = 11) for analysis due to small sample size.

^eRace and ethnicity was missing for 40 respondents.

^fRemoved "Don't know" responses from denominator for analysis (n = 19).

FIGURE 1--Marijuana store and product advertising in Oregon (from top to bottom, left to right): Storefront with signage associating marijuana to wellness; streetside marketing with cartoon owl; billboard associating marijuana to outdoor recreation; billboard advertising free bong with purchase of marijuana; placard for marijuana-related feature story in local newspaper associating marijuana with Girl Scout cookies; billboard advertising marijuana dabs; and sign-waver advertising retail marijuana outside a dispensary: Oregon, 2015, 2016 and 2017.

