HHS Public Access

Author manuscript

Ann Intern Med. Author manuscript; available in PMC 2019 March 04.

Published in final edited form as:

Ann Intern Med. 2018 September 04; 169(5): 282–290. doi:10.7326/M18-0810.

Risks and Benefits of Marijuana Use:

A National Survey of U.S. Adults

Salomeh Keyhani, MD, MPH, **Stacey Steigerwald, MSSA**, **Julie Ishida, MD, MAS**, **Marzieh Vali, MS**, **Magdalena Cerdá, DrPH**, **Deborah Hasin, PhD**, **Camille Dollinger, BS**, **Sodahm R. Yoo, BS**, and **Beth E. Cohen, MD, MAS**

University of California, San Francisco, and San Francisco Veterans Affairs Medical Center, San Francisco, California (S.K., J.I., B.E.C.); Northern California Institute for Research and Education, San Francisco, California (S.S., M.V., C.D., S.R.Y.); University of California, Davis, Davis, California (M.C.); and Columbia University, New York, New York (D.H.).

Abstract

Background: Despite insufficient evidence regarding its risks and benefits, marijuana is increasingly available and is aggressively marketed to the public.

Objective: To understand the public's views on the risks and benefits of marijuana use.

Design: Probability-based online survey.

Setting: United States, 2017.

Participants: 16 280 U.S. adults.

Measurements: Proportion of U.S. adults who agreed with a statement.

Results: The response rate was 55.3% ($n = 9003$). Approximately 14.6% of U.S. adults reported using marijuana in the past year. About 81% of U.S. adults believe marijuana has at least 1 benefit, whereas 17% believe it has no benefit. The most common benefit cited was pain management (66%), followed by treatment of diseases, such as epilepsy and multiple sclerosis (48%), and relief from anxiety, stress, and depression (47%). About 91% of U.S. adults believe marijuana has at

Corresponding Author: Salomeh Keyhani, MD, MPH, San Francisco VA Medical Center, 4150 Clement Street, Box 111A1, San Francisco, CA 94121; Salomeh.Keyhani@ucsf.edu.

Current author addresses and author contributions are available at Annals.org.

Current Author Addresses: Drs. Keyhani and Cohen, Ms. Steigerwald, Ms. Vali, Ms. Dollinger, and Ms. Yoo: San Francisco VA Medical Center, 4150 Clement Street, Box 111A1, San Francisco, CA 94121.

Dr. Ishida: San Francisco VA Medical Center, 4150 Clement Street, Box 111J, San Francisco, CA 94121.

Dr. Cerdá: Department of Emergency Medicine, University of California, Davis, 4150 V Street, Suite 2100, Sacramento, CA 95817.

Dr. Hasin: Mailman School of Public Health, Columbia University, 722 West 168th Street, Room 228F, New York, NY 10032.

Author Contributions: Conception and design: S. Keyhani, S. Steigerwald, J. Ishida, M. Cerdá, C. Dollinger, S.R. Yoo. Analysis and interpretation of the data: S. Keyhani, S. Steigerwald, J. Ishida, M. Vali, M. Cerdá, D. Hasin, B.E. Cohen.

Drafting of the article: S. Keyhani, S. Steigerwald, C. Dollinger, S.R. Yoo.

Critical revision for important intellectual content: S. Keyhani,S. Steigerwald, J. Ishida, M. Cerdá, D. Hasin, B.E. Cohen. Final approval of the article: S. Keyhani, S. Steigerwald, J. Ishida, M. Vali, M. Cerdá, D. Hasin, C. Dollinger, S.R. Yoo, B.E. Cohen.

Statistical expertise: M. Vali.

Collection and assembly of data: S. Keyhani, S. Steigerwald.

Disclosures: Authors have disclosed no conflicts of interest. Forms can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M18-0810.

least 1 risk, whereas 9% believe it has no risks. The most common risk identified by the public was legal problems (51.8%), followed by addiction (50%) and impaired memory (42%). Among U.S. adults,29.2% agree that smoking marijuana prevents health problems. About 18% believe exposure to secondhand marijuana smoke is somewhat or completely safe for adults, whereas 7.6% indicated that it is somewhat or completely safe for children. Of the respondents, 7.3% agree that marijuana use is somewhat or completely safe during pregnancy. About 22.4% of U.S. adults believe that marijuana is not at all addictive.

Limitation: Wording of the questions may have affected interpretation.

Conclusion: Americans' view of marijuana use is more favorable than existing evidence supports.

Marijuana is legal in 30 states and the District of Columbia for medicinal purposes and in 8 states for recreational use (1). These legal changes have been accompanied by an increase in daily marijuana use, as well as in marijuana dependence, among adults in the U.S. population (2). Further, the prevalence of past-year marijuana use in the adult general population doubled in the past decade, reaching 13.3% in 2014 (3).

With legalization of recreational marijuana, rapid commercialization has ensued. Retail marijuana sales exceed $1 billion annually in Colorado and Washington, the first 2 states to legalize marijuana for recreational purposes (4, 5). Extensive media coverage of the business, agricultural, and financial aspects of recreational legalization may be desensitizing the public to safety concerns (6, 7). Marijuana is being described on the Internet as a product that may be consumed safely during pregnancy; a product with preventive benefits that improves indices of metabolism, such as glucose and lipid levels; and a potential cure for cancer (8, 9).

Whereas the marketing of tobacco and alcohol to consumers is heavily regulated, promotion of marijuana products has no such constraints. Mass marketing of marijuana to the public has not been accompanied by public health messages about the potential risks of these products, because the evidence base describing both benefits and harms is limited (10, 11). In the past few years, a substantial effort has been made to identify the risks and benefits of marijuana, as well as the gaps in evidence. Several recent systematic reviews found insufficient evidence to support the use of cannabinoids for treating musculoskeletal pain and low-strength evidence that marijuana use is effective in managing neuropathic pain (12). A recent meta-analysis concluded that heavy cannabis use increases the risk for psychotic outcomes and that "there is sufficient evidence to justify harm reduction prevention programs" (13). Although low-strength evidence suggests that marijuana smoking is associated with cough and sputum production, data are insufficient regarding how daily marijuana use might affect long-term physical health, including the effects of frequent or heavy use on cardiovascular outcomes (such as stroke and myocardial infarction), obstructive lung disease, pulmonary function, and cancer (14, 15). Available data are also insufficient on the effect of marijuana use among older persons and adults with chronic health conditions (12). Several studies reported neurocognitive risks with marijuana use, including effects on memory, attention, educational outcomes, and life satisfaction, as well as risk for dependence, but the evidence base is limited and debate continues on whether use

in adolescence is associated with an irreversible adverse effect on IQ and cognition (16, 17). Emerging data suggest that marijuana may adversely affect treatment of depression and anxiety and that regular marijuana use is associated with emergency department visits and fatal vehicle crashes (16).

Because of the dearth of data on the adverse consequences of marijuana use and the increasing avail ability of cannabis products, understanding how the public perceives marijuana use is important (11). National surveys suggest that the perception of “great risk” from weekly marijuana use dropped from 50.4% in 2002 to 33.3% in 2014 (3). However, we have little understanding of public perceptions of other domains of marijuana use, including specific risks and benefits, potential preventive health benefits, and societal effects (such as exposure to secondhand smoke and driving under the influence). In addition, we have little information on how Americans view marijuana compared with tobacco and alcohol, 2 commonly used substances for which decades of research has created a robust understanding of the potential risks. Finally, no data exist on how perceptions of risks and benefits may vary according to the history of marijuana use.

We conducted a national survey to develop a more comprehensive understanding of the views of U.S. adults toward marijuana use to help public health leaders and state and federal policymakers improve communication regarding risks, benefits, and current gaps in knowledge.

Methods

Survey Development

We reviewed existing federal surveys, peer-reviewed literature, and media reports to identify questions used to assess perceived risks and benefits of marijuana use (16, 18–20). In addition, 2 of the authors (S.K and S.S.) interviewed professionals in various fields, including substance abuse and mental health experts, medical dispensary staff, and marijuana distributors, to understand forms of consumption and potential reasons for marijuana use among the public. On the basis of our review of existing national surveys, our literature review, interviews with professionals in the field, and the investigative team’s experiences (including personal interaction with the public), we drafted survey items that focused on improving our understanding of the general public’s views on marijuana and specifically addressed content areas not covered by federally sponsored surveys. These content areas included perceptions of specific risks and benefits of marijuana use, possible preventive health benefits of different methods of marijuana consumption (smoking, vaping, ingestion), addiction potential, safety of use during pregnancy, and societal effects (including secondhand smoke and driving under the influence). We also developed survey items to compare the perceived safety of marijuana versus alcohol and tobacco. The purpose of these questions was to gauge how Americans view the safety of daily use of marijuana relative to that of commonly used substances with a more established risk profile. The items were motivated partly by the team’s observation (shared by other groups) that marijuana smoking and secondhand exposure to marijuana smoke are common and tolerated in certain areas of California (21). The survey also included items de signed to capture forms of marijuana use, frequency of use, reasons for use, and knowledge and behaviors associated

with use. Overall, 27 questions were designed to capture opinions and 54 to capture use. We designed the survey to include a spectrum of answer options to enable respondents to identify the statement most closely aligned with their beliefs. Because many of the questions did not have clear-cut, scientific answers, we specifically did not include an "I don't know" option to ensure that respondents chose a statement closest to their current views. Survey items and content were written at an eighth-grade level and tested with online software (22). Cognitive testing of the items was done with a convenience sample of 40 adults of different ages and education levels, including marijuana users and nonusers, to iteratively refine the content.

Sampling Strategy

To survey U.S. adults, we used Growth from Knowledge (GfK) KnowledgePanel, a probability-based, nationally representative online panel of the civilian, non-institutionalized U.S. population (23). Growth from Knowledge created KnowledgePanel by randomly sampling addresses. This address-based panel covers 97% of the United States and represents a statistical sample of the country's population. Households without Web access are provided with an Internet connection and a tablet to ensure participation. All panel members are sampled with a known probability of selection; no one can volunteer to participate. Sampling of participants was stratified by the legalization status (recreational, medical, or nonlegal) of their states to allow comparisons across states. We oversampled 2 groups (California residents and adults aged 18 to 26 years) to support additional research questions. Sampling weights were provided by GfK. Further details on KnowledgePanel's sampling strategy are provided at www.knowledgenetworks.com/knpanel/docs/knowledgepanel(R)-design-summary-description.pdf.

Survey Administration

The survey was piloted in a random sample of 20 participants to review and refine online administration. The Internet survey was launched on 27 September 2017 to 16 280 U.S. adults aged 18 years and older. Data collection was completed on 9 October 2017. The Committee of Human Subject Research of the University of California, San Francisco, exempted GfK's conduct of the survey from review.

Statistical Analysis and Weighting

The response rate, determined by using methods outlined by the American Association for Public Opinion Research, was the ratio of respondents to all participants who received the survey (24). Growth from Knowledge provided final survey weights to account for oversampling of California residents and for nonresponse. Results were weighted by using weights provided by GfK to approximate the U.S. population on the basis of age, sex, race, ethnicity, education level, household income, home ownership, and metropolitan area. Respondents who did not answer all the questions were dropped from the analysis. All analyses used weighting commands based on variables provided by GfK to generate national estimates. To assess how well our sample correlated with federally sponsored surveys, we compared the sociodemographic characteristics of our respondents with those of participants in the 2015 National Survey on Drug Abuse and Health (NSDUH), which provides information on the epidemiology of substance abuse and marijuana use in the United States

(18, 20). We combined responses to present views as appropriate. The decision to combine results was made at the design stage and was geared toward gauging the direction a respondent was leaning in his or her views. Descriptive statistics were calculated for all items, and results were categorized by time of last marijuana use and age. All analyses were performed with R statistical software, version R-3.4.0 (The R Foundation).

Role of the Funding Source

The funders played no role in the design, conduct, and reporting of the research or in the decision to submit the manuscript for publication.

Results

Response Rate and Participant Characteristics

Overall, 9003 persons responded to the survey, a response rate of 55.3%. The response rate did not vary with regard to legalization status of the state (55.2%, 55.4%, and 55.3%, respectively, for states with recreational, medically legal, and nonlegal status). The rate of missing data or refusal by survey question varied from 0% to 3.9%. Mean age of the sample was 48 years (range, 18 to 94 years). Among the respondents, 52% were women, 64% were white, 12% were black, 16% were Hispanic, and 8% were of other races. Sociodemographic characteristics, including age, sex, race, education level, employment status, and household size, were largely similar to those of NSDUH respondents. Some differences were seen in income level, with KnowledgePanel participants having slightly higher incomes than NSDUH respondents (Table 1).About 14.6% of U.S. adults reported using marijuana in the past year.

Perceptions of Specific Risks and Benefits

Overall, 81% of U.S. adults believe that marijuana has at least 1 benefit, whereas 17% believe it has no benefit. The benefit most commonly cited by respondents was pain management (65.7%), followed by treatment of dis eases, such as epilepsy and multiple sclerosis (47.9%), and relief from anxiety, stress, and depression (46.8%). When respondents were asked which benefit is most portant, they most commonly endorsed pain management (34.8%), followed by treatment of diseases, such epilepsy and multiple sclerosis (25.2%), and relief stress, anxiety, and depression (11.7%) (Table 2).

Overall, 91% of U.S. adults believe marijuana has at least 1 risk, whereas 9% believe it has no risks. The most common risk identified by respondents was legal problems (51.8%), followed by addiction (50%) and impaired memory (42%). When asked about the most important risk, respondents most commonly indicated addiction (21.3%), followed by legal problems (20.7%) and increased use of other drugs (18%).

Overall, more past-year users than nonusers of marijuana agreed with statements indicating that marijuana use has benefits, as well as statements suggesting that marijuana use has no risks. About 1 in 10 marijuana users agreed that addiction is the most important risk associated with marijuana use. Far more nonusers than users agreed that marijuana use has no benefits, and fewer nonusers agreed that marijuana use has no risks.

Preventive Health Benefits

More than a third (36.9%) of U.S. adults strongly or somewhat strongly agree that edible marijuana prevents health problems. More than a quarter (29.2%) strongly or somewhat strongly agree that smoking or vaping marijuana prevents health problems (Figure 1).

Addiction

Overall, 76% of U.S. adults agree that marijuana is somewhat or very addictive, and 22.4% agree that it is not at all addictive (Table 3 and Appendix Figure 1, available at Annals.org).

Pregnancy

Among the survey respondents, 92.1% agree that using marijuana during pregnancy is completely or somewhat unsafe. Only 7.3% agree that it is somewhat or completely safe (Table 3 and Appendix Figure 2, available at Annals.org).

Beliefs Toward Secondhand Smoke

About 18% of U.S. adults agree that exposure to secondhand marijuana smoke is safe for adults, and 7.6% agree it is safe for children (Table 3 and Figure 2).

Comparisons Between Marijuana and Other Substances

More than 1 in 3 adults (37.3%) believe that secondhand smoke from marijuana is safer than that from tobacco. More than 1 in 3 (38.2%) agree that smoking 1 marijuana joint a day is much safer or somewhat safer than smoking 1 cigarette a day. About 13.5% agree that smoking 1 marijuana joint per day is safer than drinking 1 glass of wine per day (Table 3 and Appendix Figure 3, available at Annals.org).

The distribution of views on driving under the influence of marijuana is relatively normal. About 27.6% agree that driving under the influence of marijuana is somewhat safer or much safer than driving under the influence of alcohol. About 44.4% agree that driving under the influence of marijuana is as safe as driving under the influence of alcohol, and about 24.7% agree that it is somewhat or much less safe (Appendix Figure 3).

Belief Patterns by Marijuana Use Status and Age

Overall, the rates of agreement with statements suggesting a lack of harm from marijuana use (Table 3) are higher among marijuana users and generally higher among younger adults (aged 18 to 34 years) than in older groups (Table 3).

Discussion

Most Americans believe that marijuana has both risks and benefits. Although many survey respondents agreed that marijuana may have therapeutic benefits in managing some conditions (such as pain or multiple sclerosis), for which limited evidence of benefit exists, they also believe that marijuana is beneficial in treating insomnia, depression, and anxiety, for which efficacy and safety have not been established and possible harms may exist (12, 25, 26). In addition, a sizable group of survey participants responded that marijuana has no risks or addiction potential and that smoking marijuana prevents health problems.

The survey questions comparing marijuana use with drinking a glass of wine daily provide a useful context in which to evaluate the public's beliefs. About 13.5% of respondents indicated that daily marijuana smoking is safer than a daily glass of wine. Although excessive alcohol use is associated with many health risks, moderate alcohol intake may prevent coronary heart disease (27, 28); however, not enough data exist to support the notion that marijuana use in any form prevents health problems. That 29.2% of U.S. adults strongly or somewhat strongly agree that smoking marijuana prevents health problems is concerning.

The comparisons of daily tobacco versus marijuana use in this study also were informative. Although some investigators reported that marijuana smoking is not detrimental to lung function, the participants in those studies had a low cumulative lifetime exposure and the researchers examined risks in younger cohorts that used marijuana only 2 to 4 times per month over a 20-year follow-up (29, 30). More research is needed to inform our understanding of the long-term health effects of daily marijuana smoking. Despite insufficient evidence for potential harms from daily marijuana smoking, media coverage of existing studies with low cumulative exposure may be creating the impression among the public that smoking marijuana, even on a daily basis, is harmless (10). Likewise, many Americans do not believe that secondhand marijuana smoke is as toxic as secondhand tobacco smoke and believe it is safe to expose adults to secondhand marijuana smoke. Although data on these comparisons are limited or lacking, these views are nonetheless concerning given the evidence that inhalation of particulate matter in any form (for example, breathing smog or secondhand tobacco smoke or smoking) is associated with increased cardiovascular risk (31, 32). The public seems to have a more favorable view of marijuana smoking or exposure to secondhand marijuana smoke than is warranted by our current understanding of the detrimental health effects of inhaling particulate matter (31).

That the American public overall has a favorable view of marijuana use may not be surprising. Several historical trends (including the advocacy for decriminal ization given the societal costs of the war on drugs, evidence that cannabinoids have therapeutic and palliative effects for some intractable conditions (12, 33), aggressive marketing of cannabis to the public, and slanted media coverage of marijuana) and ongoing public conversation surrounding legalization of marijuana for recreational use may be sending an overall message that it is safe to use marijuana (6, 7, 10, 34,35). The current, largely state-based regulatory structure to protect consumers is inadequate. The lack of a coherent national policy regulating the sale and promotion of marijuana has left a vacuum that commercial interests can exploit.

This study had several limitations. The survey response rate was 55.3%; however, this rate is similar to that of other national Internet surveys (36–39). Use of an Internet survey might limit generalizability, because persons who choose to join an ongoing Internet panel may differ from those who choose not to. However, studies examining nonresponse to panel recruitment in GfK's KnowledgePanel found no evidence of nonresponse bias in the panel with regard to core demographic and socioeconomic variables (40). In addition, although some differences were observed in income distribution between our sample and the NSDUH respondents, the members of both panels were very similar in terms of age, sex, race, education level, household size, and employment status. Finally, we did not conduct

reliability testing of the opinion questions, and it is possible that wording of these items introduced bias, which may have affected respondents' interpretation. Future research should include more psychometric testing of the items to minimize directional bias introduced by the content of the questions.

The gaps in our understanding of the health effects and safety of daily marijuana use are extensive, and the public may be underestimating its long-term risks. These national data underscore the need to invest in further research to better understand both the health effects of marijuana use and the public health investment necessary to better communicate potential health risks to the public.

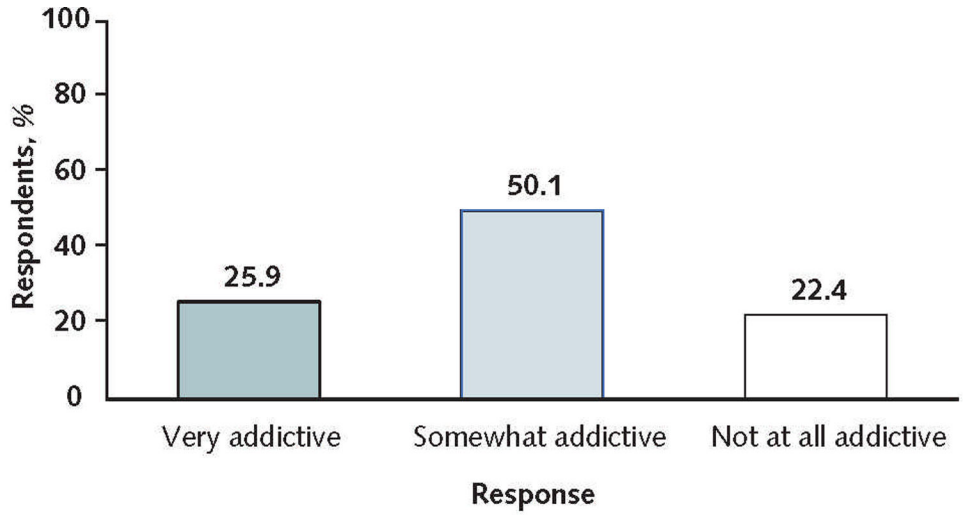
Acknowledgments

Grant Support: In part by the National Heart, Lung, and Blood Institute of the National Institutes of Health under grant R01HL130484–01A1. Dr. Keyhani's administrative funds provided by the Northern California Institute for Research and Education also supported this work. Dr. Ishida was supported by career development award K23DK103963 from the National Institute of Diabetes and Digestive and Kidney Diseases.

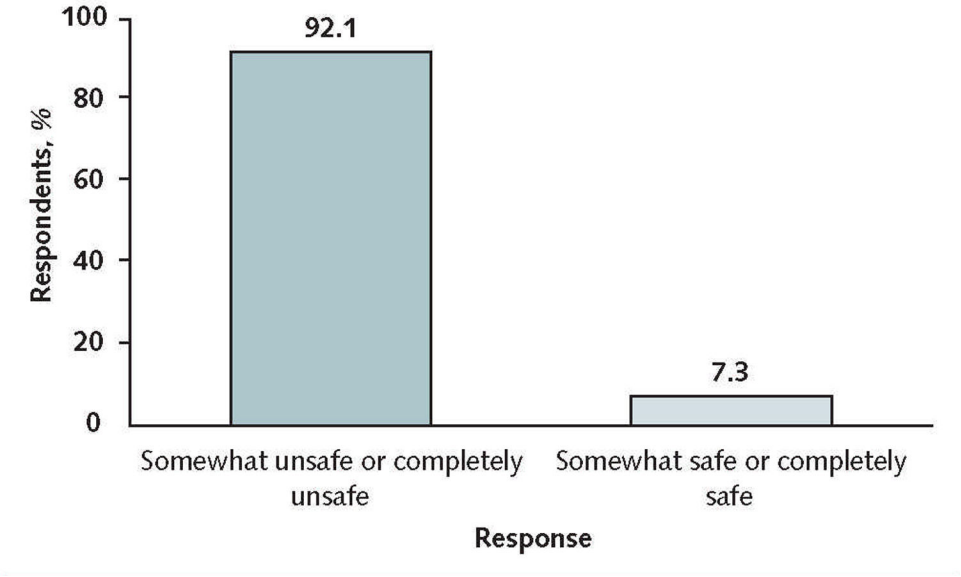
Reproducible Research Statement: *Study protocol:* Blank survey tool available from Dr. Keyhani upon request (e-mail, salomeh.keyhani@ucsf.edu). *Statistical code:* Not available. *Data set:* Will be available at https://phprg.ucsf.edu/ before 1 June 2019.

Primary Funding Source: National Heart, Lung, and Blood Institute.

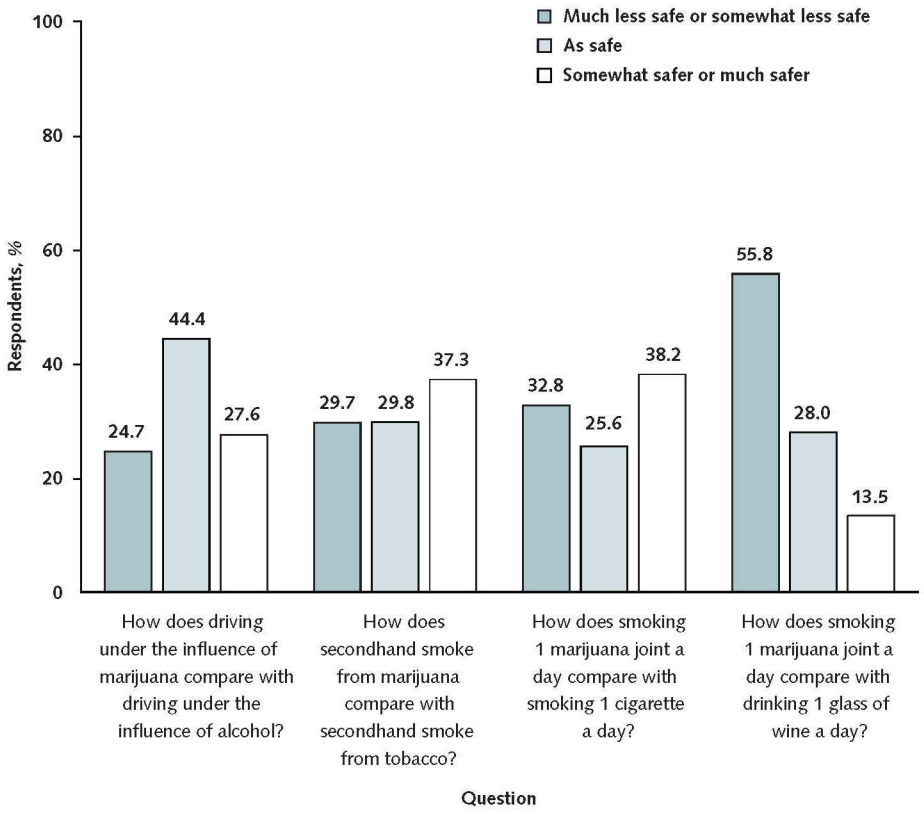
Appendix Figure 1.: Responses to the question, "How addictive is marijuana?" among U.S. adults.



Appendix Figure 2.: Responses to the question, “How safe is it for pregnant women to use marijuana?” among U.S. adults.



Appendix Figure 3.: Views among U.S. adults about driving under the influence of marijuana compared with alcohol, and comparisons of marijuana with tobacco and wine.



References

1. Chu YW. The effects of medical marijuana laws on illegal marijuana use. J Health Econ. 2014;38:43–61. [PMID:] doi:10.1016/j.jhealeco.2014.07.003 [PubMed: 25205609]
2. Hasin DS, Sarvet AL, Cerdá M, Keyes KM, Stohl M, Galea S, et al. US adult illicit cannabis use, cannabis use disorder, and medical marijuana laws: 1991–1992 to 2012–2013. JAMA Psychiatry. 2017;74: 579–88. [PMID:] doi:10.1001/jamapsychiatry.2017.0724 [PubMed: 28445557]
3. Compton WM, Han B, Jones CM, Blanco C, Hughes A. Marijuana use and use disorders in adults in the USA, 2002–14: analysis of annual cross-sectional surveys. Lancet Psychiatry. 2016;3:954–64. [PMID:] doi:10.1016/S2215-0366(16)30208-5 [PubMed: 27592339]
4. Williams J High returns: Colorado pot sales over $100 million a month. Newsweek. 15 7 2017 Accessed at www.newsweek.com/colorado-marijuana-sales-legalization-2017-637126 on 10 July 2018.
5. Lewis M Pot sales reach new high of $1.1 billion in 2016. KIRO7. Updated 9 1 2017 Accessed at www.kiro7.com/news/local/pot-sales-reach-new-high-of-11-billion-in-2016/482776341 on 10 July 2018.
6. McGinty EE, Samples H, Bandara SN, Saloner B, Bachhuber MA, Barry CL. The emerging public discourse on state legalization of marijuana for recreational use in the US: analysis of news media coverage, 2010–2014. Prev Med. 2016;90:114–20. [PMID:] doi:10.1016/j.ypmed.2016.06.040 [PubMed: 27373208]

7. Abraham A, Zhang AJ, Ahn R, Woodbridge A, Korenstein D, Keyhani S. Media content analysis of marijuana's health effects in news coverage. J Gen Intern Med. 2018 [PMID:] doi:10.1007/s11606-018-4492-9 [PubMed: 29845473]
8. Loria K, Welsh J. 21 medical benefits of marijuana. Business Insider. 21 4 2015 Accessed at www.businessinsider.com.au/facts-on-marijuana-and-health-2015-4 on 4 June 2018.
9. U.S. Food and Drug Administration. FDA warns companies marketing unproven products, derived from marijuana, that claim to treat or cure cancer [press release]. Silver Spring: U.S. Food and Drug Administration; 1 11 2017 Accessed at www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm583295.htm on 18 December 2017.
10. Loria K 23 health benefits of marijuana. Business Insider. 7 3 2018 Accessed at www.businessinsider.com/health-benefits-of-medical-marijuana-2014-4/#it-can-be-used-to-treat-glaucoma-1 on 4 June 2018
11. Steigerwald S, Wong PO, Khorasani A, Keyhani S. The form and content of cannabis products in the United States. J Gen Intern Med. 2018 [PMID:] doi:10.1007/s11606-018-4480-0 [PubMed: 29770952]
12. Nugent SM, Morasco BJ, O'Neil ME, Freeman M, Low A, Kondo K, et al. The effects of cannabis among adults with chronic pain and an overview of general harms: a systematic review. Ann Intern Med. 2017;167:319–31. [PMID:] doi:10.7326/M17-0155 [PubMed: 28806817]
13. Marconi A, Di Forti M, Lewis CM, Murray RM, Vassos E. Meta-analysis of the association between the level of cannabis use and risk of psychosis. Schizophr Bull. 2016;42:1262–9. [PMID:] doi:10.1093/schbul/sbw003 [PubMed: 26884547]
14. Ghasemiesfe M, Ravi D, Vali M, Korenstein D, Arjomandi M, Frank J, et al. Marijuana use, respiratory symptoms, and pulmonary function. A systematic review and meta-analysis. Ann Intern Med. 2018 [PMID:] doi:10.7326/M18-0522 [PubMed: 29971337]
15. Ravi D, Ghasemiesfe M, Korenstein D, Cascino T, Keyhani S. Associations between marijuana use and cardiovascular risk factors and outcomes: a systematic review. Ann Intern Med. 2018;168:187–94. [PMID:] doi:10.7326/M17-1548 [PubMed: 29357394]
16. Hasin DS. US epidemiology of cannabis use and associated problems. Neuropsychopharmacology. 2018;43:195–212. [PMID:] doi:10.1038/npp.2017.198 [PubMed: 28853439]
17. Volkow ND, Compton WM, Weiss SR. Adverse health effects of marijuana use [Letter]. N Engl J Med. 2014;371:879 [PMID:] doi:10.1056/NEJMc1407928 [PubMed: 25162899]
18. Cerdá M, Wall M, Keyes KM, Galea S, Hasin D. Medical marijuana laws in 50 states: investigating the relationship between state legalization of medical marijuana and marijuana use, abuse and dependence. Drug Alcohol Depend. 2012;120:22–7. [PMID:] doi:10.1016/j.drugalcdep.2011.06.011 [PubMed: 22099393]
19. Hasin DS, Grant B. NESARC findings on increased prevalence of marijuana use disorders-consistent with other sources of information. JAMA Psychiatry. 2016;73:532 [PMID:] doi:10.1001/jamapsychiatry.2015.3158 [PubMed: 27008098]
20. Azofeifa A, Mattson ME, Schauer G, McAfee T, Grant A, Lyerla R. National estimates of marijuana use and related indicators—National Survey on Drug Use and Health, United States, 2002–2014. MMWR Surveill Summ. 2016;65:1–28. [PMID:] doi:10.15585/mmwr.ss6511a1 [PubMed: 27584586]
21. Glantz SA, Halpern-Felsher B, Springer ML. Marijuana, secondhand smoke, and social acceptability. JAMA Intern Med. 2018;178: 13–4. [PMID:] doi:10.1001/jamainternmed.2017.5301 [PubMed: 29159409]
22. The SMOG Readability Formula. 2018 Accessed at www.readabilityformulas.com/smog-readability-formula.php on 10 July 2018.
23. GfK. KnowledgePanel. 2017 Accessed at www.gfk.com/products-a-z/us/knowledgepanel-united-states on 18 December 2017.
24. American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcomes Rates for Surveys. Oakbrook Terrace, IL: American Association for Public Opinion Research; 2016.
25. Blanco C, Hasin DS, Wall MM, Flórez-Salamanca L, Hoertel N, Wang S, et al. Cannabis use and risk of psychiatric disorders: prospective evidence from a US national longitudinal study. JAMA

Psychiatry. 2016;73:388–95. [PMID:] doi:10.1001/jamapsychiatry.2015.3229 [PubMed: 26886046]

26. Koppel BS, Brust JC, Fife T, Bronstein J, Youssof S, Gronseth G, et al. Systematic review: efficacy and safety of medical marijuana in selected neurologic disorders: report of the Guideline Development Subcommittee of the American Academy of Neurology. Neurology. 2014;82:1556–63. [PMID:] doi:10.1212/WNL.0000000000000363 [PubMed: 24778283]
27. Gaziano JM, Buring JE, Breslow JL, Goldhaber SZ, Rosner B, VanDenburgh M, et al. Moderate alcohol intake, increased levels of high-density lipoprotein and its subfractions, and decreased risk of myocardial infarction. N Engl J Med. 1993;329:1829–34. [PMID:] [PubMed: 8247033]
28. Berger K, Ajani UA, Kase CS, Gaziano JM, Buring JE, Glynn RJ, et al. Light-to-moderate alcohol consumption and the risk of stroke among U.S. male physicians. N Engl J Med. 1999;341:1557–64. [PMID:] [PubMed: 10564684]
29. Pletcher MJ, Vittinghoff E, Kalhan R, Richman J, Safford M, Sidney S, et al. Association between marijuana exposure and pulmonary function over 20 years. JAMA. 2012;307:173–81. [PMID:] doi:10.1001/jama.2011.1961 [PubMed: 22235088]
30. Hancox RJ, Poulton R, Ely M, Welch D, Taylor DR, McLachlan CR, et al. Effects of cannabis on lung function: a population-based cohort study. Eur Respir J. 2010;35:42–7. [PMID:] doi: 10.1183/09031936.00065009 [PubMed: 19679602]
31. Pope CA, 3rd, Burnett RT, Krewski D, Jerrett M, Shi Y, Calle EE, et al. Cardiovascular mortality and exposure to airborne fine particulate matter and cigarette smoke: shape of the exposure-response relationship. Circulation. 2009;120:941–8. [PMID:] doi:10.1161/CIRCULATIONAHA.109.857888 [PubMed: 19720932]
32. Brook RD, Rajagopalan S, Pope CA, 3rd, Brook JR, Bhatnagar A, Diez-Roux AV, et al.; American Heart Association Council on Epidemiology and Prevention, Council on the Kidney in Cardiovascular Disease, and Council on Nutrition, Physical Activity and Metabolism. Particulate matter air pollution and cardiovascular disease: an update to the scientific statement from the American Heart Association. Circulation. 2010;121:2331–78. [PMID:] doi:10.1161/CIR.0b013e3181dbece1 [PubMed: 20458016]
33. O'Neil ME, Nugent SM, Morasco BJ, Freeman M, Low A, Kondo K, et al. Benefits and harms of plant-based cannabis for posttraumatic stress disorder: a systematic review. Ann Intern Med. 2017;167:332–40. [PMID:] doi:10.7326/M17-0477 [PubMed: 28806794]
34. Volkow ND, Han B, Compton WM, Blanco C. Marijuana use during stages of pregnancy in the United States [Letter]. Ann Intern Med. 2017;166:763–4. [PMID:] doi:10.7326/L17-0067 [PubMed: 28418460]
35. Dickson B, Mansfield C, Guiahi M, Allshouse AA, Borgelt LM, Sheeder J, et al. Recommendations from cannabis dispensaries about first-trimester cannabis use. Obstet Gynecol. 2018;131:1031–8. [PMID:] doi:10.1097/AOG.0000000000002619 [PubMed: 29742676]
36. Fowler FJ, Jr, Gerstein BS, Barry MJ. How patient centered are medical decisions?: results of a national survey. JAMA Intern Med. 2013;173:1215–21. [PMID:] doi:10.1001/jamainternmed.2013.6172 [PubMed: 23712194]
37. Yu J, Nagler RH, Fowler EF, Kerlikowske K, Gollust SE. Women's awareness and perceived importance of the harms and benefits of mammography screening: results from a 2016 national survey. JAMA Intern Med. 2017;177:1381–2. [PMID:] doi:10.1001/jamainternmed.2017.2247 [PubMed: 28654987]
38. Hesse BW, Nelson DE, Kreps GL, Croyle RT, Arora NK, Rimer BK, et al. Trust and sources of health information: the impact of the Internet and its implications for health care providers: findings from the first Health Information National Trends Survey. Arch Intern Med. 2005;165:2618–24. [PMID:] [PubMed: 16344419]
39. Bleakley A, Jordan AB, Hennessy M. The relationship between parents' and children's television viewing. Pediatrics. 2013;132: e364–71. [PMID:] doi:10.1542/peds.2012-3415 [PubMed: 23858418]
40. Heeren T, Edwards EM, Dennis JM, Rodkin S, Hingson RW, Rosenbloom DL. A comparison of results from an alcohol survey of a prerecruited Internet panel and the National Epidemiologic Survey on Alcohol and Related Conditions. Alcohol Clin Exp Res. 2008;32: 222–9. [PMID:] [PubMed: 18162076]

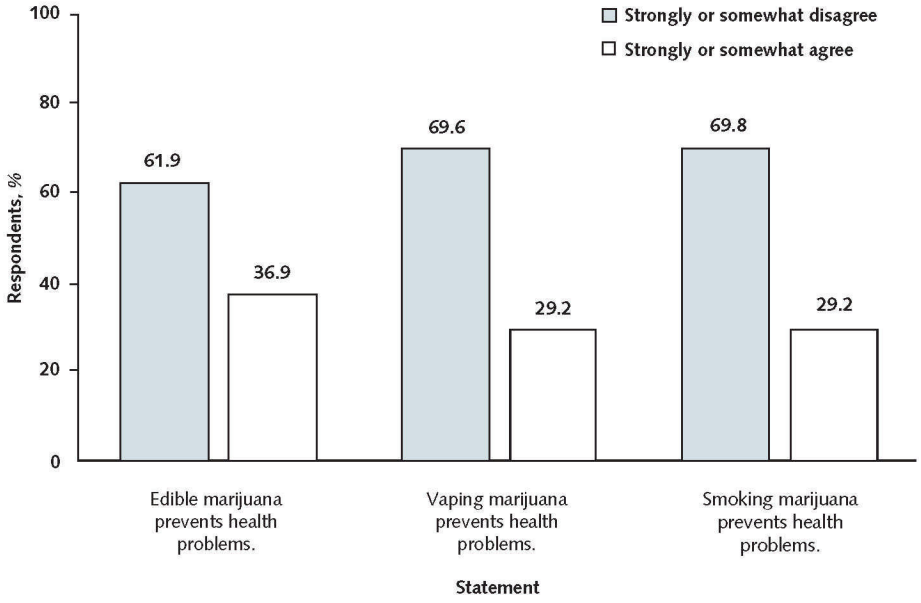


Figure 1.

Views of U.S. adults aged 18 years or older on whether different forms of marijuana prevent health problems.

Full distribution of responses: Among participants, 7.4% strongly agreed, 29.5% somewhat agreed, 32.7% somewhat disagreed, and 29.2% strongly disagreed that edible marijuana prevents health problems; 5.7% strongly agreed, 23.5% somewhat agreed, 33.9% somewhat disagreed, and 35.7% strongly disagreed that vaping marijuana prevents health problems; and 6.3% strongly agreed, 22.9% somewhat agreed, 30.6% somewhat disagreed, and 39.2% strongly disagreed that smoking marijuana prevents health problems.

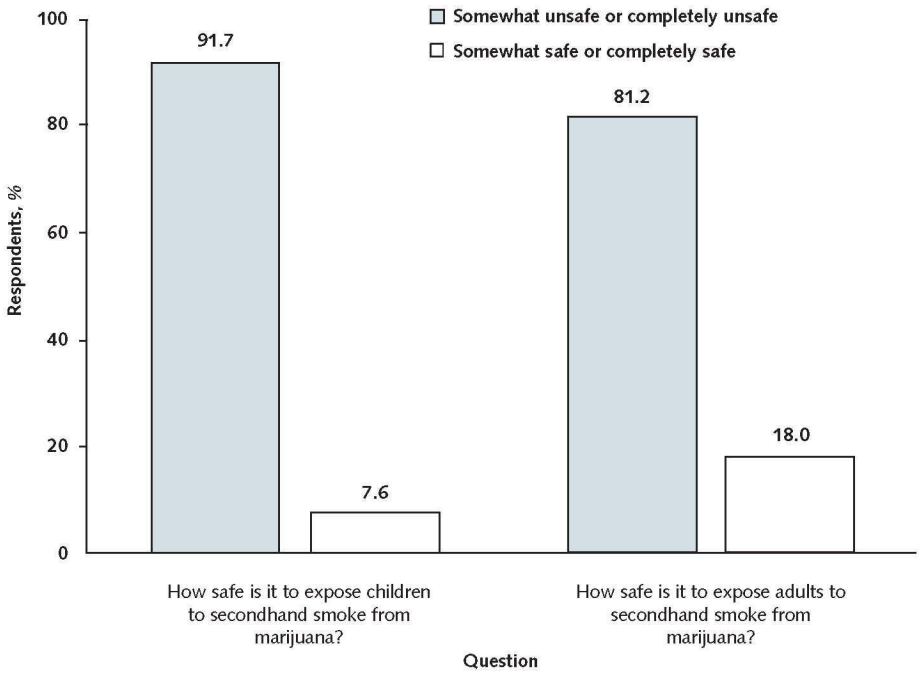


Figure 2.
Views among U.S. adults about the safety of secondhand marijuana smoke.

Table 1.

Baseline Characteristics of KP Respondents Compared With NSDUH Respondents*

Characteristic	2017 KP (*n* = 9003)	2015 NSDUH (*n* = 43 561)
Age		
18–34 y	2543 (29)	23 637 (30)
35–49 y	2172(24)	11 164(25)
50–64 y	2466(27)	5157(26)
≥65 y	1822(20)	3598(19)
Sex		
Male	4325 (48)	19 828(48)
Female	4678 (52)	23 733(52)
Race		
White	5772 (64)	26 025 (65)
Black	1067(12)	5502(12)
Hispanic	1430(16)	7648(15)
Other	734(8)	4386 (8)
Highest education level		
High school diploma or less	3573(39)	18 081 (40)
Some college	2579(29)	14 504(30)
Bachelor's degree or higher	2850(32)	10 976(30)
Employment status		
Working	5579(62)	29 183(62)
Not working	3424(38)	14 378(38)
Mean number of persons in household	3	3†
Household income		
<$20 000	1074(12)	9703(18)
$20 000–$49 999	2075(23)	14 015(30)
$50 000–$74 999	1567(17)	6770(17)
≥$75 000	4287 (48)	13 073(35)

KP = KnowledgePanel; NSDUH = National Survey on Drug Use and Health.

*Values are unweighted numbers (weighted percentages).

†Responses of 6 or more were calculated as a value of 6.

Table 2.

Views on Risks and Benefits of Marijuana Use Among U.S. Adults Aged 18 Years or Older, by Past-Year Use *

Variable	Total U.S. Population (*n* = 9003)	Past-Year Use	
		Yes (*n* = 1270)	No (*n* = 7733)
What do you believe are the benefits of marijuana?			
Pain management	65.7	87.6	62.0
Treatment of disease (such as epilepsy or multiple sclerosis)	47.9	68.6	44.4
Relief from stress, anxiety, or depression	46.8	87.5	39.9
Improved appetite	35.1	73.6	28.5
Improved sleep	28.9	71.2	21.7
Help decreasing orstopping other medicines	23.3	54.6	17.9
Improved creativity	16.2	52.3	10.1
Improved focus or concentration	10.6	35.0	6.4
Increased energy	8.1	29.0	4.6
Other benefit	5.1	4.4	5.3
Marijuana has no benefits	17.2	1.7	19.8
Declined to answer	2.2	0.5	2.5
Which benefit of marijuana do you believe is most important?			
Pain management	34.8	29.2	35.8
Treatment of disease (such as epilepsy or multiple sclerosis)	25.2	25.6	25.1
Relief from stress, anxiety, or depression	11.7	29.6	8.5
Help decreasing orstopping other medicines	2.4	5.2	1.9
Improved appetite	2.2	2.6	2.1
Improved sleep	1.1	3.3	0.7
Improved focus or concentration	0.3	0.6	0.3
Improved creativity	0.2	0.6	0.1
Increased energy	0.2	0.6	0.2
Other benefit	4.2	1.0	4.7
Marijuana has no benefits	17.6	1.7	20.4
Declined to answer	0.2	0.1	0.2
What do you believe are the risks of marijuana?			
Legal problems	51.8	45.5	52.9
Addiction to marijuana	50.0	20.8	55.0
Impaired memory	42.0	29.9	70.1
Increased use of other drugs	37.4	8.9	42.2
Personal or relationship problems	34.8	16.0	38.0
Decrease in intelligence (IQ)	28.6	10.3	31.8
Decrease in energy	27.4	25.6	27.7
New or worsening health problems	18.0	5.0	20.3
Increase in stress, anxiety, or depression	15.0	9.1	16.1
Disrupted sleep	11.3	5.0	12.4
Other risk	5.6	5.3	5.6

Variable	Total U.S. Population (*n* = 9003)	Past-Year Use	
		Yes (*n* = 1270)	No (*n* = 7733)
Marijuana has no risks	8.8	22.9	6.4
Declined to answer	2.1	1.7	2.2
Which risk of marijuana do you believe is most important?			
Addiction to marijuana	21.3	9.6	23.3
Legal problems	20.7	33.7	18.5
Increased use of other drugs	18	4.0	20.4
Impaired memory	7.7	8.6	7.5
Decrease in intelligence (IQ)	5.2	1.9	5.8
Personal or relationship problems	4.8	4.8	4.7
New or worsening health problems	3.8	2.1	4.1
Decrease in energy	2.8	5.7	2.3
Increase in stress	2.1	2.4	2.1
Disrupted sleep	0.3	0.5	0.3
Other risk	4.1	3.5	4.2
Marijuana has no risks	9	23.3	6.6
Declined to answer	0.2	0	0.2

* Values are weighted percentages. Respondents were given the response options provided here.

Table 3.

Views of Persons in the United States on Important Public Health Domains Pertaining to Marijuana Use *

Variable	U.S. Adults (*n* = 9003)	Past-Year Use		Age			
		Yes (*n* = 1270)	No (*n* = 7733)	18–34 y (*n* = 2543)	35–49 y (*n* = 2172)	50–64 y (*n* = 2466)	≥65 y (*n* = 1822)
How addictive is marijuana?							
Very	25.9	4	30	22	25	24	32
Somewhat	50.1	42	51	49	49	53	49
Not at all	22.4	53	17	27	25	22	18;
How safe is marijuana use for pregnant women?							
Completely unsafe	76.3	46	81	69	70	79	85
Somewhat unsafe	15.8	30	13	19	19	15	11
Somewhat safe	5.0	16	3.1	8.3	6.7	3.4	2.4
Completely safe	2.3	7.9	1.4	3.4	3.6	1.6	1.1
How does driving under the influence of marijuana compare with driving under the influence of alcohol?							
Much less safe	15.2	5.2	17	12	13	15	19
Somewhat less safe	9.5	5.5	10	7.5	7.1	10	13
Equally safe	44.4	27	47	41	45	46	45
Somewhat safer	17.1	29	15	22	17	17	14
Much safer	10.5	32	6.9	14	14	8.8	6
How does smoking 1 marijuana joint per day compare with smoking 1 cigarette per day?							
Much less safe	17.9	4.3	20	13	15	17	25
Somewhat less safe	14.9	6.4	16	9.9	13	16	19
Equally safe	25.6	14	28	21	25	29	27
Somewhat safer	18.8	21	18	23	20	18	15
Much safer	19.4	53	14	30	24	16	11
How safe is exposing adults to secondhand smoke from marijuana?							
Completely unsafe	49.3	11	56	38	44	52	60
Somewhat unsafe	31.9	39	31	34	32	33	29
Somewhat safe	11.6	28	8.9	17	15	9.8	6.6
Completely safe	6.4	22	3.7	9.8	8.4	5.1	3.4
How safe is exposing children to secondhand smoke from marijuana?							
Completely unsafe	72.8	48	77	65	67	75	81
Somewhat unsafe	18.9	31	17	22	21	19	15
Somewhat safe	5.2	14	3.7	8	7.1	4	2.5
Completely safe	2.4	6.6	1.7	3.6	3.8	1.5	1

Variable	U.S. Adults (*n* = 9003)	Past-Year Use		Age			
		Yes (*n* = 1270)	No (*n* = 7733)	18–34 y (*n* = 2543)	35–49 y (*n* = 2172)	50–64 y (*n* = 2466)	≥65 y (*n* = 1822)
How does secondhand smoke from marijuana compare with secondhand smoke from tobacco?							
Much less safe	16.4	4.5	18	12	l.»	1?	*23*
Somewhat less safe	13.3	4.7	15	9.5	16	14”	19
Equally safe	29.8	16	32	26	28	33	31
Somewhat safer	20.7	28	20	25	23	21	16
Much safer	16.6	46	12	25	22	12	9.7
How does smoking 1 marijuana joint per day compare with drinking 1 glass of wine per day?							
Much less safe	32.1	8.4	36	25	28	33	41
Somewhat less safe	23.7	11	26	23	23	24	25
Equally safe	28.0	41	26	30	29	30	24
Somewhat safer	6.2	13	4.9	8.5	6.6	6.2	4.1
Much safer	7.3	24	4.4	11	11	4.7	3.9

*Values are weighted percentages.