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Modes of ever marijuana use among adult tobacco users and non-tobacco users—*Styles* 2014

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Abstract

Background—Tobacco and marijuana use are related behaviors; therefore, it is important to identify how users consume marijuana, and how it varies with tobacco use status. We estimated the modes of ever marijuana use among current, former, and never adult tobacco users.

Methods—Weighted data were analyzed for 4181 adults from 2014 *Styles*, an online consumer panel survey of US adults, to estimate proportions for modes of ever marijuana use. Differences in modes of ever marijuana use between categories of tobacco use status were assessed (*p*-value <0.05).

Results—More than half of current (56.6%) and former tobacco users (50.9%) had ever used marijuana, whereas only 13.0% of never tobacco users had ever used marijuana. Among ever marijuana users, joint use was the most common mode of use among current (86.4%), former (92.5%), and never (79.8%) tobacco users. Similarly, other modes of marijuana use were significantly higher in current and former tobacco users compared to never tobacco users.

Conclusions—Prevalence of all modes of ever marijuana use was higher in current and former tobacco users. These findings underscore the importance of considering the relationship between marijuana and tobacco use when developing programs and policies aimed at preventing and reducing marijuana use.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Keywords

Marijuana; mode of use; tobacco

Background

Tobacco and marijuana are two of the most frequently used addictive substances in the USA and worldwide (Center for Behavioral Health Statistics and Quality, 2014). According to data from the 2013 National Survey on Drug Use and Health (NSDUH), 71.7% of adults aged 18 years or older had ever used tobacco, and 27.3% reported past 30-day use (Center for Behavioral Health Statistics and Quality, 2014). In the same survey, 46.6% of adults reported ever use of marijuana, and 7.6% reported past 30-day marijuana use (Center for Behavioral Health Statistics and Quality, 2014).

Adults who use tobacco are more likely to have ever used marijuana and those who have ever used marijuana are more likely to use tobacco (Peters et al., 2012; Ramo et al., 2013). Use of tobacco and marijuana together may increase the risk of tobacco dependence and adverse health effects (Baggio et al., 2014). With legalization of medical and recreational marijuana use in several states, it has become increasingly important to identify how users consume marijuana, and how that use varies with tobacco use status in order to inform public health programs and policies.

Modes of ever marijuana use may differ between current, former, and never tobacco users. Adults who have ever used marijuana in a particular way may be more likely to use marijuana in that way in the future. Further, knowing how marijuana has ever been used among current, former, and never tobacco users provides insight into the relationship between marijuana and tobacco use. This can inform tailored public health programs and policies aimed at preventing and reducing marijuana and tobacco use in these specific groups. The purpose of this study is to estimate the proportion of modes of ever marijuana use among current, former, and never tobacco users aged 18 years and older, using *Styles*, an online consumer panel survey conducted among US adults in 2014.

Material and methods

Subjects

Styles are a series of nationally representative online consumer panel surveys of US adults aged 18 years and older conducted several times a year; data from Styles are licensed to the Centers for Disease Control and Prevention by Porter Novelli. The survey is conducted by GfK Knowledge Networks, which produces a probability-based sample from an address-based sampling frame. The survey used for the present study was conducted in June–July 2014 (Summer Wave) and was sent to a random sample of 4545 panelists, as well as a supplemental sample of 1614 panelists with children aged 12–17 years who answered the spring wave of *Styles*. A total of 4269 adults completed the survey for a response rate of 69%. Respondents with missing tobacco or marijuana use data were excluded from this analysis, resulting in a sample size of 4181.

Measures

Tobacco use—To ascertain cigarette smoking, respondents who reported smoking at least 100 cigarettes in their lifetimes were asked if they currently smoked cigarettes every day, some days, or not at all. Respondents separately reported ever and current (past 30-day) use of other tobacco products by selecting all products used during both periods from the following list: cigars; cigarillos; little cigars; chewing tobacco, snuff, dip; electronic cigarettes; electronic hookahs, hookah pens, vape pens; other electronic vapor products; water pipes; roll your own cigarettes; snus; or dissolvable tobacco products. Current tobacco users were classified as respondents who currently smoked cigarettes every day or some days and/or used any other tobacco product in the past 30 days. Former tobacco users were those who reported smoking at least 100 cigarettes in their lifetimes and/or ever using any other tobacco product, but were currently not using cigarettes at all compared to every day or some days, and not using any other tobacco products in the past 30 days. Never tobacco users were those who reported not smoking 100 cigarettes in their lifetimes and never using any of the other assessed tobacco products.

Marijuana use—Ever marijuana users were classified as respondents who reported ever using marijuana in one or more of the following ways: joint; blunt or cigar with marijuana in it; bowl or small glass pipe; bong or water pipe; hookah pipe; vaporizer or other electronic device; baked in food; in a drink (e.g., in tea, cola, or alcohol); with heated hashish oil, hash oil, or honey butane oil; or used in some other way. Due to small sample sizes and similar modes of administration, "bong/water pipe" and "hookah" were combined into one mode of use category. Additionally, ever use of marijuana "baked in food" and "in a drink" were combined into an "edible" category. Mode of current marijuana use is not reported by tobacco use status due to limited sample sizes and large relative standard errors for these estimates.

Sociodemographic factors—Demographic characteristics included: age group (18–24, 25–34, 34–44, 45–64, 65), sex (male or female), race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic other), education (<high school, high school graduate, some college, college graduate), and income (<\$25,000, \$25,000–\$39,999, \$40,000–\$59,999, \$60,000+).

Analysis

Data were analyzed using SAS-callable SUDAAN using survey weights provided by Styles to match U.S. Current Population Survey proportions on gender, age, household income, race/ethnicity, household size, education, census region, metro status, and prior Internet access. The proportion of the sample that used each mode of marijuana was computed by tobacco use status (current, former, and never), both overall and by sociodemographic characteristics. To compare the levels of categorical variables, we used a *t*-statistic to test for significant differences in modes of ever marijuana use between categories of tobacco use status (*p*-value <0.05). Estimates with a relative standard error 30% were considered statistically unstable and not reported.

Results

More than half of current (56.6%) and former tobacco users (50.9%) had ever used marijuana, whereas only 13.0% of never tobacco users had ever used marijuana (Table 1). This pattern of greater ever marijuana use among current and former tobacco users compared to never tobacco users was observed across age, sex, racial/ethnic, education, and income categories. Joints were the most common mode of ever using marijuana regardless of tobacco use status.

Among ever marijuana users, 86.4% of current tobacco users, 92.5% of former tobacco users, and 79.8% of never tobacco users had ever smoked marijuana in a joint (Table 2). A higher proportion of current tobacco users (36.6%) had ever used a blunt (cigar with marijuana in it), compared to former (20.9%) and never (11.0%) tobacco users. More than half of current and former tobacco users had ever used marijuana in bowls or small glass pipes (54.2% and 50.1%, respectively) and in bongs, water pipes, or hookahs (54.9% and 51.8%, respectively). In contrast, only 27.0% of never tobacco users who had ever used marijuana had used it in a bowl or small glass pipe and 30.3% had ever used marijuana in a bong, water pipe, or hookah. Use of edible marijuana was also significantly higher in current and former tobacco users (32.2% and 30.3%, respectively) than in never tobacco users (20.3%). Ever use of marijuana in a vaporizer or other electronic device was similar among current (12.3%) and former (9.3%) tobacco users. One in ten (10.8%) current tobacco users and 8.0% of former tobacco users had ever used marijuana with heated hashish oil, hash oil, or honey butane oil. Ever using marijuana in some other way was reported by 5.8% of current tobacco users and 6.4% of former tobacco users.

Discussion

Findings from this survey of US adults suggest that about half of current and former tobacco users had used marijuana at least once in their lifetime. In contrast, only 13% of never tobacco users had ever used marijuana, with similar use patterns across demographic subcategories. Joints were the most commonly reported mode of ever using marijuana, regardless of tobacco use status. However, prevalence of all modes of ever marijuana use was significantly higher in current and former tobacco users compared to never tobacco users. Additionally, nearly one in ten current and former tobacco users had ever used marijuana in a vaporizer or other electronic device. With the increase in use of electronic nicotine delivery systems (McMillen et al., 2014; Regan et al., 2013), use of these devices to consume marijuana might also increase (Malouff et al., 2013; Richter & Levy, 2014).

Our findings of higher proportions of ever marijuana use in current and former tobacco users compared to never tobacco users are consistent with previous research that indicate tobacco and marijuana use are closely associated behaviors (Agrawal et al., 2012; Rabin & George, 2015; Ramo et al., 2012; Richter et al., 2005). There are many possible explanations for this association. For example, the primary mode of use for both tobacco and marijuana is through combustion, and shared modes of use may promote this association (Agrawal et al., 2012; Agrawal & Lynskey, 2009; Baggio et al., 2014). Additionally, this association may also be influenced by shared genetic factors (Agrawal et al., 2012; Agrawal et al., 2010),

pharmacological interactions (nicotine augments and prolongs the effects of marijuana) (Cooper & Haney, 2009; Tullis et al., 2003), and environmental factors (e.g., peer influences, substance availability, opportunity to use, and social norms) (Agrawal et al., 2012). Finally, the gateway drug theory, which proposes that use of a gateway drug, typically a legal druglike tobacco, leads to the subsequent use of a usually illegal drug, like marijuana (Degenhardt et al., 2010). Recent evidence has documented a less common but growing reverse gateway pattern, with marijuana use preceding tobacco use (Agrawal et al., 2012; Patton et al., 2005; Peters et al., 2012).

Notably, 11% of never tobacco users reported using blunts (cigars with marijuana in them). Blunt use is not consistently considered as cigar or tobacco use (Delnevo et al., 2011). Some argue that blunt use is distinct from cigar use because all or most of the tobacco from inside the cigar is removed to create a blunt (Golub et al., 2006; Soldz et al., 2003), whereas others consider blunt use to be cigar use, because there is nicotine exposure from the cigar wrapper alone (Delnevo et al., 2011; Dunlap et al., 2005; Henningfield et al., 1999; Timberlake, 2009). Our results indicate that at least some ever blunt users did not consider blunt use to be cigar or other tobacco use. More research investigating how adults conceptualize blunt use and tobacco use in various contexts could inform surveillance to provide more accurate categorization of tobacco and marijuana use.

Findings from this study are subject to at least four limitations. First, generalizability may be limited because the sampling approaches used were not completely random. However, data were weighted to match 2014 U.S. Current Population Survey proportions on gender, age, household income, race/ethnicity, household size, education, census region, metro status, and prior Internet access. Second, findings might be subject to nonresponse bias if nonresponders were significantly different than responders in their tobacco or marijuana use. Third, survey responses were self-reported, which could lead to reporting bias; however, previous research has confirmed the validity of self-reported tobacco smoking (Caraballo et al., 2004). Finally, current marijuana use could not be examined due to small sample size. It will be important for future studies to use a more robust sample to further assess current marijuana use by tobacco use groups.

Despite these limitations, this study is the first to explore differences in modes of ever marijuana use between current, former, and never tobacco users. These findings confirm that tobacco and marijuana use are closely related behaviors and provide greater insight into the relationship between tobacco and marijuana use by detailing how tobacco users have ever used marijuana. Differences in modes of ever marijuana user by tobacco use status highlight the importance of considering the association between marijuana and tobacco use while developing interventions to prevent and reduce use of both substances. Greater understanding of how marijuana use differs between tobacco users and non-tobacco users could inform public health programs and policies aimed at controlling tobacco and marijuana use.

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Table 1Proportion of ever marijuana use by tobacco use status among adults 18 years, *Styles* 2014.

	Current tob	Current tobacco use ^a $(N = 450)$	Former toba	Former tobacco use $b (N = 834)$	Never toba	Never tobacco use ^{c} ($N = 244$)
Characteristic	%	95% CI	%	95% CI	%	12 %56
Overall	56.6	(52.5, 60.8)	50.9	(48.1, 53.7)	13.0	(11.2, 14.9)
Age (in years)						
18–24	65.4	(51.4, 79.4)	59.9	(45.8, 74.1)	9.6	(4.5, 14.7)
25–34	63.5	(52.9, 74.2)	64.5	(55.6, 73.4)	14.3	(8.6, 19.9)
35-44	53.3	(43.4, 63.2)	49.8	(42.6, 57.0)	13.4	(9.4, 17.4)
45–54	62.8	(55.2, 70.4)	63.2	(57.3, 69.1)	15.1	(11.0, 19.2)
55+	44.7	(37.8, 51.5)	40.8	(37.1, 44.5)	12.9	(10.2, 15.6)
Sex						
Men	61.2	(55.8, 66.5)	53.1	(49.4, 56.8)	14.2	(10.9, 17.6)
Women	50.7	(44.2, 57.3)	48.4	(44.1, 52.7)	12.3	(10.1, 14.5)
Race/ethnicity						
White, NH	57.8	(53.1, 62.5)	49.5	(46.5, 52.6)	11.2	(9.3, 13.2)
Black, NH	56.7	(44.3, 69.2)	55.4	(44.6, 66.1)	18.4	(12.5, 24.3)
Hispanic	55.1	(42.7, 67.4)	59.1	(49.9, 68.3)	19.3	(12.4, 26.2)
Other, NH	48.6	(29.6, 67.6)	42.5	(27.7, 57.4)	I	
Education						
SH>	54.6	(43.0, 66.1)	42.1	(30.7, 53.4)	13.0	(6.0, 20.0)
HS graduate	49.9	(43.1, 56.6)	45.9	(40.8, 51.1)	12.9	(9.3, 16.6)
Some college	62.9	(55.7, 70.2)	57.7	(52.7, 62.7)	13.9	(10.4, 17.4)
College graduate	62.5	(53.5, 71.4)	51.8	(40.0, 56.5)	12.5	(9.6, 15.3)
Income						
<\$25,000	55.1	(47.2, 63.0)	57.0	(49.4, 64.7)	17.3	(11.6, 23.0)
\$25,000-\$39,999	49.1	(39.5, 58.8)	47.0	(39.9, 54.1)	13.7	(8.6, 18.8)
\$40,000-\$59,999	51.7	(41.7, 61.8)	43.2	(36.7, 49.6)	15.4	(10.3, 20.5)
\$60,000	63.8	(57.2, 70.5)	52.5	(48.6, 56.4)	10.9	(8.7, 13.2)

N, unweighted sample size; CI, confidence interval; - Relative standard error (RSE) >30%; NH, non-Hispanic; HS, high school.

^aCurrent tobacco users were classified as respondents who currently smoked cigarettes every day or some days and/or used any other tobacco products (cigars; cigarillos; little cigars; chewing tobacco,

snuff, dip; electronic cigarettes; electronic hookahs, hookah pens, vape pens; other electronic vapor products; water pipes; roll your own cigarettes; snus; or dissolvable tobacco products) in the past 30-days. b Former tobacco users were those who smoked at least 100 cigarettes and/or reported ever using any other tobacco product but did not report using cigarettes currently and did not report using any other

 $^{C}_{
m Never}$ tobacco users did not smoke 100 lifetime cigarettes and never used any other tobacco products.

tobacco products in the past 30 days.

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Table 2

Modes of ever marijuana use by tobacco use status among ever marijuana users aged 18 years, Styles 2014.

	Current tob	Current tobacco user ^a $(N = 450)$	Former tob	Former tobacco user $b (N = 834)$	Never toba	Never tobacco user ^{c} ($N = 244$)
Mode of use	%	95% CI	%	95% CI	%	95% CI
Joint	86.47	(82.2, 90.5)	92.58	(89.9, 95.1)	78.67	(73.2, 86.5)
Blunt or a cigar with marijuana in it	36.678	(31.1, 42.0)	\$* 6.02	(17.5, 24.4)	$11.0^{*\!7}$	(5.5, 16.4)
Bowl or small glass pipe	54.28	(48.6, 59.7)	50.18	(46.1, 54.1)	27.0 *†	(20.1, 34.0)
Bong, water pipe, or hookah	54.98	(49.4, 60.4)	51.88	(47.8, 55.8)	30.3 *7	(23.1, 37.4)
Edible (baked in food or added to drink, e.g., tea, cola, or alcohol)	32.28	(27.1, 37.4)	30.38	(26.7, 33.9)	$20.3 * ^{+}$	(14.5, 26.1)
A vaporizer or other electronic device	12.9	(9.1, 16.6)	9.3	(6.9, 11.7)	ı	
With heated hashish oil, hash oil, or honey butane oil	10.8	(7.4, 14.3)	8.0	(5.9, 10.1)	1	
Used in some other way	5.8	(3.4, 8.2)	6.4	(4.4, 8.3)	1	

N, unweighted sample size; CI, confidence interval; - Relative standard error (RSE) > 30%.

snuff, dip; electronic cigarettes; electronic hookahs, hookah pens, vape pens; other electronic vapor products; water pipes; roll your own cigarettes; snus; or dissolvable tobacco products) in the past 30 days. a Current tobacco users were classified as respondents who currently smoked cigarettes every day or some days and/or used any other tobacco products (cigars; cigarillos; little cigars; chewing tobacco,

berner tobacco users were those who smoked at least 100 cigarettes and/or reported ever using any other tobacco product but did not report using cigarettes currently and did not report using any other

 c Never tobacco users did not smoke 100 lifetime cigarettes and never used any other tobacco products.

tobacco products in the past 30-days.

^{*} Significantly different from current tobacco users.

 $[\]vec{f}_{\rm Significantly}$ different from former to bacco users.

 $^{^{\$}}$ Significantly different from never to bacco users.