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Prevalence and Correlates of Simultaneous and Separate 30-Day Use of Tobacco and Cannabis: Results from the California Adult Tobacco Survey

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Abstract

Background: There is limited information on separate use and simultaneous use of tobacco and cannabis products, particularly for new electronic nicotine delivery systems (ENDS). This study presents detailed information about the prevalence and correlates of individual use, separate use, and simultaneous use of tobacco and cannabis in California, the first state to allow medical marijuana in the US. It specifically distinguishes between simultaneous use (both substances used in the same occasion) and separate use (both products used, but not simultaneously).

Objectives: Participants in the 2016 California Adult Tobacco Survey (N = 3,058; age range 18–64 years) completed online surveys between February and March 2016 that assessed tobacco and cannabis use in the past 30 days.

Results: Participants' use of tobacco (15% cigarettes) was higher than use of ENDS (6%) or cannabis (10%); the overall rate of separate use was 6% and the overall rate of simultaneous use was 3%. Correlates of tobacco use included lower levels of education and income. Correlates of simultaneous tobacco and cannabis use included being unemployed or having a disability.

Conclusions/Importance: This survey of California residents suggests how use patterns change in states that legalize medical marijuana prior to recreational cannabis, although it may underestimate prevalence due to reliance on self-reported use. Persons who were unemployed and persons with disabilities were at higher risk for simultaneous use of tobacco and cannabis. These findings suggest that prevention and cessation interventions intended to target simultaneous use should address these populations, as well as adolescents and young adults.

Keywords

Tobacco use; cannabis use; marijuana; United States; California

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Declaration of interest

The authors declare that they have no conflict of interest. The authors alone are responsible for the content and writing of the article.

Ethical approval and protection of human participants

This study was approved by the Institutional Review Board (IRB) of University of California, San Francisco as exempt (#16–20094).

Introduction

In the US, tobacco and cannabis use are common, particularly among adolescents and young adults (ages 18–25) (Agrawal, Budney, & Lynskey, 2012; Ramo, Liu, & Prochaska, 2012; Wang, Ramo, Lisha, & Cataldo, 2016) Simultaneous tobacco and cannabis use (e.g. combining tobacco and cannabis in a blunt) is common in Europe and increasingly common in the US (Agrawal, Madden, Bucholz, Heath, & Lynskey, 2008; Behrendt, Wittchen, Hofler, Lieb, & Beesdo, 2009; Hammersley and Leon, 2006; Patton, Coffey, Carlin, Sawyer, & Lynskey, 2005; Redzic, Licanin, & Krosnjar, 2003; Smit, Monshouwer, & Verdurmen, 2002; Timberlake et al., 2007). As companies promote new smoking devices that may be used for both tobacco and cannabis, such as e-cigarettes and vaporizers, those who previously used either tobacco or cannabis alone may be more prone to using both drugs (Budney, Sargent, & Lee, 2015). Some users believe that combining tobacco with cannabis in a single occasion can enhance or prolong the psychoactive effects of cannabis use (Giroud et al., 2015), and those who vape tobacco and cannabis believe that vaping is a safe form of ingesting each substance (Giroud et al., 2015). Simultaneous use is associated with more symptoms of dependence, reduced motivation to quit, and greater social problems that separate use (Baggio, Studer, Mohler-Kuo, Daeppen, & Gmel, 2014; Schlienz and Lee, 2018), however, prevalence data assessing simultaneous use among other vulnerable population groups has been limited. These findings suggest a need to make explicit distinctions in surveillance data between two types of tobacco and cannabis use: (a) simultaneous use, meaning both products are consumed during the same occasion, and (b) separate use, in which respondents consume both products but do not do so during the same occasion.

The current policy landscape provides multiple pathways that could lead to increased simultaneous use. Electronic nicotine delivery systems (ENDS), including e-cigarettes, may encourage those who vape nicotine to also vape cannabis. Legalization of recreational cannabis can lead to use among some adults who would not have used cannabis when it was illegal (Barry & Glantz, 2016; Orenstein & Glantz, 2018). Given that more states have legalized medical marijuana and recreational cannabis, use is likely to increase (Hall & Lynskey, 2016). Given the likely increases in use, predicting patterns of tobacco and cannabis consumption in these states is critically important.

Many ongoing surveys collect information about alcohol, tobacco, and other drug use in the US, including the National Survey on Drug Use and Health (NSDUH), Monitoring the Future, and the National Adult Tobacco Survey (NATS). While these surveys provide extensive information on the national level about the prevalence of substance use, data on different possible patterns of tobacco and cannabis couse at the state level are not necessarily available.

California was a policy innovator in the late 1990s, the first in the US to decriminalize the use of medical marijuana (1996) and eliminate smoking in bars (1998). This combination of policies changed attitudes about the use of tobacco and cannabis, making tobacco use less socially acceptable and cannabis use more so. Consistent with these changes in attitudes, in 2016 California passed a number of innovative policies again, legalizing the recreational use,

cultivation, and sale of cannabis, raising the minimum age of legal access for tobacco and cannabis to 21 years, and regulating e-cigarettes under existing tobacco control laws. Despite a growing number of studies examining the relationship between tobacco and cannabis use, no surveillance studies have characterized the prevalence of simultaneous use (i.e. use of both products in a single occasion) in California relative to the separate use of tobacco and cannabis. We report on the results of a 2016 population-based survey of adults in California, two decades after the first major changes to tobacco and medical marijuana laws but prior to the implementation of the 2016 policy changes. The survey asked detailed questions about tobacco and cannabis (both medical and recreational) use patterns and modalities. We specifically investigated characteristics of respondents who reported simultaneous use of tobacco and cannabis, distinguishing these users from those who reported separate use, as well as the use of each substance individually.

Methods

This study relied on a cross-sectional analysis of survey data drawn from the California Adult Tobacco Survey (CATS), a weighted representative sample of approximately 3,000 California adult residents. Data are collected under a contract with the California Tobacco Control Program, which requires that the data be collected from an existing probability-based online sample that has been used in peer reviewed publications. In 2016, the contractor for CATS data collection was the GfK Group (Growth from Knowledge), The Growth from Knowledge \(GfK\) Group (2016), a survey research firm based in Germany. The 2016 wave was completed prior to the implementation of 2016 policy changes for cannabis and tobacco. The online study was conducted in English and in Spanish using computer-assisted self-interview (CASI) and the panel related on probability-based sampling of addresses. Response rates from GfK surveys are reported by GfK to be approximately 65%, with the possibility of minor variations due to survey length, topic, and other fielding characteristics, The Growth from Knowledge \(GfK\) Group (2016). A detailed description of the study design and sampling strategy is available from the California Tobacco Control Program (California Department of Public Health, 2016).

Respondents were queried about tobacco and cannabis use, and modality of use, in the past 30 days. Modalities of tobacco use included cigarettes, smokeless, cigars, little cigars/cigarillos, pipes, hookah, and e-cigarettes. Modalities of cannabis use, whether medical or recreational, included smoking, eating, drinking, vaping, dabbing, or “another way” volunteered by the respondent. Questions were based on the National Adult Tobacco Survey conducted by the US Centers for Disease Control and Prevention (CDC). Simultaneous users were identified by asking participants if they had used cannabis in the past 30 days; the modality by which they had used cannabis, and then, “You said you used marijuana [in the past 30 days]. Did you use marijuana with any form of tobacco in it, such as a blunt or a joint with a combination of tobacco and marijuana?’” Separate users were those who indicated consuming both cannabis and tobacco in the past 30 days, but who did not report simultaneous use.

After collection, data were weighted based on California demographics drawn from the 2010 and 2015 Current Population Surveys. We identified weighted 30-day prevalence estimates

and cross-tabulations for tobacco and cannabis use using the software package STATA version 15. We then created weighted odds ratios (OR) based on multivariate logistic regression (Cox model) to identify any statistically significant associations between 30-day tobacco and cannabis use, considering whether respondents were users of individual substances, were separate users, or were simultaneous users, relative to sociodemographic characteristics and age of first use or initiation. We included measures of employment indicating whether respondents were employed, temporarily unemployed or seeking work, or part of a residual category that included retirees, students, and stay-at-home spouses or partners. The study was approved as exempt by the UCSF institutional review board on July 16, 2016.

Results

Sociodemographic characteristics

The 2016 survey contained 3,058 respondents. Weighted probabilities of use in each category, by sociodemographic characteristics, are shown in Table 1. Overall prevalence rates were 14.5% for cigarette smoking, 5.6% for ENDS use, and 9.5% for cannabis use. Prevalence of separate use for tobacco and cannabis, for all modalities, was 6.1% and prevalence of simultaneous tobacco and cannabis use was 3.4%.

As shown in Table 1, rates of cigarette smoking, ENDS use, and cannabis use were higher for men than women. Rates of cigarette smoking and combined cannabis and tobacco use decreased with higher levels of education, but were not associated with higher education levels for ENDS use, cannabis use, or combined use. Rates of cigarette smoking, ENDS use, cannabis use, and combined use were highest among those unemployed and seeking work and persons with disabilities, relative to those who were employed or retired. Over half of cigarette smokers who initiated smoking over the age of 18 (52.0%) reported smoking in the past 30 days.

Risks for use

For cigarette smoking, there was a lower odds ratio among those with at least a bachelor's degree and those with household incomes greater than $100,000, as shown in Table 2. There was a significantly greater odds ratio among persons with disabilities and those who had begun smoking at 15 or older. For ENDS use, there was a significantly lower odds ratio among those aged 55 or older.

For all cannabis use, women were approximately half as likely to use as men (OR = .6, 95% CI: .4–.9). Additionally, those with household incomes from $25,000–$49,999 were half as likely to use cannabis as those who had incomes of less than $25,000 (OR = .5, 95% CI = .3–.8).

For combined tobacco and cannabis use, there was a significantly lower odds ratio among some lower-income groups. There was a significantly greater odds ratio for those who were unemployed and seeking work. For using tobacco and cannabis simultaneously, there was a significantly lower odds ratio for those with incomes $25,000–$49,999 and greater than

$75,000. There was a significantly higher odds ratio for those who were unemployed and seeking work or and persons with disabilities.

Discussion

Past research has identified the practice and consequences of simultaneous tobacco and cannabis use among adolescents, however there has been limited data on the prevalence of this practice in different population subgroups or relative to other consumption, such as use of individual substances or separate use (Agrawal et al., 2012; Ramo et al., 2012; Wang et al., 2016). Existing research suggests that young adults may be more likely to engage in simultaneous use, particularly given the increase in new modalities of use (Budney et al., 2015), however surveillance data has not yet verified this expectation (Agrawal et al., 2008; Behrendt et al., 2009; Hammersley and Leon, 2006; Patton et al., 2005; Redzic et al., 2003; Smit et al., 2002; Timberlake et al., 2007). Our findings suggest that in contrast to findings from previous research, rates of simultaneous use may be highest among those who were involuntarily unemployed and persons with disabilities rather than among youth. We also found that more people used either cannabis or ENDS than smoked cigarettes, despite the relative (legal) novelty of these products. These results suggest a transition toward modalities that allow simultaneous use, a trend that could continue or accelerate as these novel products become increasingly normalized. Research on simultaneous use suggests that such a transition would lead to more dependence and reduced quit attempts (Baggio et al., 2014; Schlienz & Lee, 2018), a concern given that these subpopulations are likely to have lower income (due to unemployment) and co-occurring conditions (disabilities).

Our findings have limitations. The data are based solely on California residents and responses reflect a policy environment that for 20 years has focused on reducing tobacco use and increasing access to medical marijuana. These policy changes preceded similar changes made in many other states, suggesting that these data (which were collected prior to the legalization of recreational cannabis), primarily provide insight into how use patterns may change over time in those states that also legalized medical marijuana prior to recreational cannabis. Survey responses were based on self-report and did not biochemically validate responses; previous research suggests that respondents may underreport use (Connor Gorber, Schofield-Hurwitz, Hardt, Levasseur, & Tremblay, 2009). As a result, our findings may have failed to identify other groups at risk of simultaneous use.

As states continue to legalize medical marijuana and recreational cannabis, it is critical to monitor shifts in patterns of tobacco and cannabis use. Adolescents and young adults have been a focus of prior research, particularly in light of their susceptibility to uptake of novel delivery devices such as JUUL (Lee, Crosier, Borodovsky, Sargent, & Budney, 2016). However our findings suggest that young adults are not necessarily the population with the highest prevalence or highest risk of simultaneous use. Simultaneous use is linked with more severe consequences than using tobacco or cannabis alone, or with separate use of these products.

Our findings that simultaneous users in California were not disproportionately young adults are relevant for developing targeted prevention and cessation interventions for individuals at

high risk. In addition to emphasizing risks faced by adolescents and young adults, our findings suggest that public health interventions should expand their focus to address other vulnerable populations, including persons who are involuntarily unemployed and those with disabilities.

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Table 1.

2016 prevalence of tobacco and cannabis use overall, and by socio-demographic and smoking characteristics.

	Cigarette smoking last 30 days (%, *N*) (*N* = 3058)	ENDS use last 30 days (%, *N*) (*N* = 3061)	Cannabis use last 30 days (%, *N*) (*N* = 2719)	Use of both tobacco and cannabis last 30 days (%, *N*) (*N* = 2883)	Simultaneous tobacco and cannabis use (%, *N*) (*N* = 3065)
Overall	14.5 (507)	5.6 (171)	9.5 (264)	2.7 (91)	3.4 (111)
Age					
18–24	12.2 (26)	7.0 (15)	10.6 (16)	3.6 (6)	3.6 (6)
25–34	19.4 (127)	8.4 (56)	12.0 (71)	3.8 (28)	5.5 (33)
35–44	15.0 (108)	6.1 (41)	10.5 (50)	3.4 (21)	3.2 (22)
45–54	11.9 (113)	4.7 (35)	7.6 (54)	1.4 (20)	2.5 (28)
55–64	12.9 (133)	2.1 (24)	7.0 (73)	1.5 (16)	2.1 (22)
Gender					
Male	16.6 (219)	6.9 (86)	11.6 (130)	2.7 (39)	3.6 (52)
Female	12.6 (288)	4.5 (85)	7.5 (134)	2.7 (52)	3.2 (59)
Education					
Less than high school	19.3 (44)	6.3 (11)	11.2 (19)	3.5 (10)	4.4 (11)
High school	14.9 (92)	4.4 (18)	6.2 (27)	3.2 (13)	3.4 (14)
Some college	15.7 (211)	6.4 (72)	12.0 (119)	3.1 (48)	4.1 (59)
Bachelor’s or higher	10.9 (159)	5.6 (70)	8.9 (99)	1.5 (20)	2.2 (27)
Employment status					
Employed	14.0 (321)	5.2 (116)	9.8 (176)	2.3 (57)	2.7 (64)
Unemployed (temporarily or seeking work)	20.5 (60)	9.9 (19)	10.5 (25)	8.1 (17)	8.2 (19)
Unemployed (other)	6.8 (39)	3.6 (15)	6.7 (18)	0.5 (3)	1.4 (5)
Retired	15.3 (32)	6.0 (7)	6.1 (15)	1.2 (3)	2.7 (6)
Disabled	29.6 (54)	8.6 (13)	14.7 (30)	4.2 (11)	9.0 (17)
Household income					
$0–24,999	20.6 (151)	5.1 (35)	13.5 (72)	4.4 (35)	6.7 (45)
$25,000–49,999	15.6 (116)	6.6 (39)	6.6 (63)	2.1 (24)	2.7 (25)
$50,000–74,999	14.9 (83)	5.6 (24)	10.1 (37)	4.5 (9)	4.8 (12)
$75,000–99,999	13.9 (78)	6.9 (39)	9.3 (36)	1.0 (8)	1.9 (11)
$100,000+	10.8 (79)	4.4 (34)	9.2 (56)	2.3 (15)	2.4 (18)

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	Cigarette smoking last 30 days (%, *N*) (*N* = 3058)	ENDS use last 30 days (%, *N*) (*N* = 3061)	Cannabis use last 30 days (%, *N*) (*N* = 2719)	Use of both tobacco and cannabis last 30 days (%, *N*) (*N* = 2883)	Simultaneous tobacco and cannabis use (%, *N*) (*N* = 3065)
Race/ethnicity					
White non-Hispanic	14.2 (218)	4.6 (72)	12.1 (143)	3.6 (42)	4.6 (59)
Black non-Hispanic	14.1 (68)	4.0 (19)	12.2 (17)	1.5 (6)	1.8 (8)
Hispanic	15.4 (166)	6.4 (59)	8.1 (87)	2.2 (35)	2.4 (33)
Other non-Hispanic	13.2 (33)	6.9 (16)	5.8 (7)	2.2 (3)	3.0 (4)
Multi non-Hispanic	15.2 (22)	7.7 (5)	8.6 (10)	2.6 (5)	4.6 (7)
Age of initiation (tobacco)					
Under 15	27.8 (108)	11.9 (40)	19.0 (66)	6.5 (27)	9.4 (38)
15–17	43.3 (156)	12.5 (47)	20.0 (57)	8.7 (29)	10.1 (35)
18+	52.0 (209)	18.7 (63)	17.5 (43)	8.9 (27)	6.7 (24)

*$P < .05$;

**$P < .01$.

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Table 2.

2016 tobacco and cannabis use by sociodemographic characteristics.

	Cigarette smoking last 30 days (OR, 95% CI)	ENDS use last 30 days (OR, 95% CI)	Cannabis use last 30 days (OR, 95% CI)	Use of both tobacco and cannabis last 30 days (OR, 95% CI)	Simultaneous tobacco and cannabis use (OR, 95% CI)
Age					
18–24	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
25–34	1.7 (.9–3.2)	1.2 (.5–2.7)	1.2 (.6–2.4)	1.1 (.3–3.3)	1.6 (.5–4.7)
35–44	1.3 (.7–2.4)	.9 (.4–2.0)	1.0 (.5–2.1)	1.0 (.3–3.4)	.9 (.3–3.1)
45–54	1.0 (.5–1.8)	.7 (.3–1.6)	.7 (.3–1.5)	.4 (.1–1.2)	.7 (.2–2.3)
55–64	1.1 (.6–2.0)	.3 (.1 −.6)	.6 (.3–1.3)	.4 (.1–1.4)	.6 (.2–1.8)
Gender					
Male	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Female	.7 (.5–1.0)	.6 (.4–1.0)	.6 (.4–.9)*	1.0 (.5–1.9)	.9 (.5–1.6)
Education					
Less than high school	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
High school	.7 (.4–1.3)	.7 (.2–1.9)	.5 (.2–1.1)	.9 (.3–3.1)	.8 (.2–2.3)
Some college	.8 (.5–1.3)	1.0 (.4–2.4)	1.1 (.6–2.1)	.9 (.3–2.7)	.9 (.3–2.5)
Bachelor's or higher	.5 (.3–.8)	.9 (.4–2.1)	.8 (.4–1.5)	.4 (.1–1.4)	.5 (.2–1.4)
Employment status					
Employed	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Unemployed (temporarily or seeking work)	1.6 (.9–2.7)	2.0 (.9–4.5)	1.1 (.5–2.3)	3.7 (1.5–9.2)**	3.2 (1.4–7.7)**
Unemployed (other)	.4 (.3–.7)	.7 (.3–1.5)	.7 (.3–1.3)	.2 (.05–.9)*	.5 (.1–1.8)
Retired	1.1 (.6–2.1)	1.2 (.3–4.4)	.6 (.3–1.1)	.5 (.1–1.8)	1.0 (.4–2.7)
Disabled	2.6 (1.5–4.4)	1.7 (.7–4.4)	1.6 (.3–1.3)	1.8 (.8–4.3)	3.5 (1.5–8.3)**
Household income					
$0–24,999	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
$25,000–49,999	.7 (.5–1.1)	1.3 (.6–2.7)	.5 (.3–.8)**	.5 (.2–.9)*	.4 (.2–.8)
$50,000–74,999	.7 (.4–1.1)	1.1 (.5–2.6)	.7 (.4–1.4)	1.0 (.4–2.7)	.7 (.3–1.8)
$75,000–99,999	.6 (.4–1.0)	1.4 (.7–2.8)	.7 (.4–1.2)	.2 (.1–.6)**	.3 (.1 −.6)
$100,000+	.5 (.3–.7)	.9 (.4–1.7)	.7 (.4–1.1)	.5 (.2–1.2)	.3 (.2–.8)

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	Cigarette smoking last 30 days (OR, 95% CI)	ENDS use last 30 days (OR, 95% CI)	Cannabis use last 30 days (OR, 95% CI)	Use of both tobacco and cannabis last 30 days (OR, 95% CI)	Simultaneous tobacco and cannabis use (OR, 95% CI)
Race/ethnicity					
White non-Hispanic	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Black non-Hispanic	1.0 (.6–1.5)	.9 (.5–1.7)	1.0 (.4–2.5)	.4 (.1–1.4)	.4 (.1–1.0) *
Hispanic	1.1 (.8–1.5)	1.4 (.9–2.3)	.6 (.4–1.0) *	.6 (.3–1.2)	.5 (.3–1.0) *
Other non-Hispanic	.9 (.5–1.6)	1.5 (.7–3.3)	.4 (.2–1.1)	.6 (.1 −2.6)	.6 (.2–2.1)
Multi non-Hispanic	1.1 (.5–2.2)	1.7 (.4–7.5)	.7 (.2–2.0)	.7 (.2–3.0)	1.0 (.3–3.3)
Age of initiation (tobacco)					
Under 15	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
15–17	2.0 (1.2–3.2) **	1.1 (.5–2.1)	1.1 (.6–1.9)	1.4 (.6–3.1)	1.1 (.5–2.2)
18+	2.8 (1.7–4.6) **	1.7 (.9–3.2)	.9 (.4–1.8)	1.4 (.6–3.5)	.7 (.3–1.7)

* $P < .05$;

** $P < .01$.

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