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The Association Between Sociodemographic Factors and co-Use of Cigars or Cigarillos with Cannabis

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Abstract

Background: Cigar/cigarillo smoking and cannabis use frequently co-occur, reflecting overlapping patterns of substance use and shared risk factors. However, little is known about how co-use of cigars/cigarillos and cannabis is associated with sociodemographic factors, as well as preferences for cannabis forms and spending patterns among co-users.

Methods: We analyzed data from the second wave of a national longitudinal survey of U.S. adults who reported recreational cannabis use in January 2025 ($N = 1,524$). The survey included detailed information on past-30-day cigar/cigarillo use, enabling comparisons between cannabis-cigar/cigarillo co-users and cannabis-only users. We compare these two groups by applying logistic regression to examine sociodemographic correlates and product-specific cannabis preferences, and OLS regression to evaluate differences in total cannabis spending.

Results: Overall, 8.26% of recreational cannabis adult users also smoke cigars/cigarillos. Compared with White, non-Hispanic cannabis users, Black, non-Hispanic users are five times ($p < 0.001$) more likely to smoke cigars/cigarillos. Compared with cannabis users with less than high school education, those with some college or a bachelor's degree are less likely to smoke

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Author contributions

CRedit: **Lei Xu:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing; **Shiqi Zhang:** Data curation, Software, Visualization, Writing – review & editing; **Lingbin Meng:** Writing – review & editing; **Ce Shang:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Resources, Software, Supervision, Writing – review & editing.

Disclosure statement

The authors declare no competing interests related to this study.

Ethical statement

This manuscript involves human subjects. The Ohio State University's institutional review board (IRB #: 2022B0032) has approved this study.

cigars/cigarillos. Cigar/cigarillo smoking among cannabis users is associated with higher use of flowers (OR = 2.16, $p < 0.05$) and pre-rolls (OR = 2.05, $p < 0.01$). Cannabis-cigar/cigarillo co-users report significantly \$72 higher monthly cannabis expenditures than cannabis-only users.

Conclusions: Adult cannabis users who are Black, non-Hispanic and have less than an associate degree are more likely to smoke cigars/cigarillos. Cannabis-cigar/cigarillo co-users are more likely to consume smoking forms of cannabis such as flowers and to spend more on cannabis, suggesting possible increased risks of harm and addiction associated with co-use.

Keywords

Addiction/dependence; cannabis/marijuana/cannabinoid; little cigar/cigarillo

Background

Co-use of cannabis and cigars/cigarillos is a common pattern of substance use in the United States and may include concurrent use of both products on different occasions as well as simultaneous use on the same occasion (Chu et al., 2023; Cohn et al., 2018; Fairman & Dutra, 2025). A particularly prevalent form of simultaneous use is blunt smoking, whereby cannabis flowers are smoked inside hollowed-out cigar wrappers (Chu et al., 2023; Hindocha & McClure, 2021; Kong et al., 2018; Nguyen et al., 2024; Peters et al., 2016; Timberlake et al., 2007). Although blunt use may be categorized as co-use of cigars/cigarillos and cannabis, some survey respondents may not consider or report blunt use as cigar/cigarillo use, resulting in inconsistent measurement and underreporting (Hindocha & McClure, 2021). This may occur because blunts are often perceived primarily as a form of cannabis consumption rather than tobacco use, particularly after the tobacco filler is removed and replaced with cannabis. Nevertheless, surveillance data show that both co-use and blunt use of cannabis and cigars/cigarillos are prevalent in the US (Pike Moore et al., 2025). In 2011–2012, 20.6% of adults who used cannabis in the past 30 days also reported cigar use (Schauer et al., 2016). Similarly, in 2015–2019, 51.5% of past 30-day cigar adult smokers reported blunt smoking (Jensen et al., 2025).

Both cannabis use and cigar/cigarillo smoking carry health risks. Cannabis use is associated with impaired cognitive functioning, cannabis use disorder, and adverse mental health outcomes, while smoking cannabis contributes to respiratory harm (Gobbi et al., 2019; Gowin et al., 2025; Hasin et al., 2015; Meier et al., 2012; National Academies of Sciences, Engineering, and Medicine Committee, 2024). As combustible tobacco, cigar and cigarillo smoking pose health risks comparable to cigarette smoking. Co-use may therefore expose individuals to compounded harms, particularly when both substances are smoked (Meier and Hatsukami, 2016; Smith et al., 2020; Timberlake et al., 2007). Furthermore, blunt smoking can expose users to residual nicotine present in cigar wrappers, potentially reinforcing tobacco dependence (Bélanger et al., 2013; Pike Moore et al., 2025; Schauer et al., 2017). Compared with other tobacco products (e.g. cigarettes and e-cigarettes), cigar/cigarillo smoking is associated with higher odds of co-use with cannabis and lower odds of quitting tobacco, suggesting a particularly high-risk behavioral profile (Strong et al., 2018).

Evidence suggests bidirectional associations between cigar/cigarillo use and cannabis use, whereby use of one product is associated with current and subsequent use of the other (Cohn & Chen, 2022; Ramo et al., 2012; Ross et al., 2020). However, the potential gateway or reinforcing effects of multiple substance use remain insufficiently understood in the context of cannabis-cigar/cigarillo co-use (Agrawal et al., 2012; Badiani et al., 2015; Degenhardt et al., 2010). These dynamics are particularly relevant in a rapidly evolving marketplace offering diverse cannabis products with varying potency and modes of administration (Pacula & Smart, 2017). Prior research shows that young adults, non-Hispanic Black individuals, Hispanic individuals, and populations of low SES—groups with high prevalence of cigar/cigarillo smoking, also demonstrate higher odds of smoking cannabis rather than using noncombustible administration modalities (e.g. vaping *via* devices like vape pens, intaking through edibles, drinks, or oral products like capsules). The shared combustion methods may reinforce co-use behaviors and contribute to elevated health risks (Agrawal & Lynskey, 2009; Diaby et al., 2025; Quader et al., 2025). Consistent with this pattern, evidence on tobacco-cannabis co-use and blunt use shows higher prevalence among males, youths, racial/ethnic minority groups, individuals of lower socioeconomic status, and sexual minority populations (Pike Moore et al., 2022; Ramo et al., 2012; Schauer et al., 2017). Meanwhile, although cigarette smoking has declined in the U.S., reductions in cigar/cigarillo smoking have been less pronounced, and blunt smoking has continued to increase (Glasser et al., 2025). These trends underscore the need for greater research attention to the co-use of cigars/cigarillos and cannabis.

Economic determinants, including spending patterns, are also likely to influence both the co-use of cigars/cigarillos and cannabis and the effectiveness and implementation of related regulations. Compared with cigarettes, cigars and cigarillos offer features such as smaller pack sizes, lower prices, and a wide variety of flavors, making them attractive alternatives for maintaining combustible tobacco use (Chen-Sankey et al., 2024; Committee on Patterns of Use and Health Effects of “Premium Cigars” and Priority Research, Board on Population Health and Public Health Practice, Health and Medicine Division, & The National Academies of Sciences, Engineering, and Medicine, 2022; Delnevo et al., 2017). Qualitative studies further indicate that adolescents and young adults consider cheap cigarillo/cigar brands to be primarily for blunt use (Kong et al., 2018). Quantifying spending patterns among individuals who co-use cigars/cigarillos and cannabis can therefore elucidate whether such co-use behaviors exacerbate or mitigate financial constraints on users, particularly those from low SES and minority populations who may already experience economic disadvantage. Evidence from prior regulatory efforts targeting cigarettes and sugar-sweetened beverages also suggests that perceived financial burdens on vulnerable populations can pose barriers to policy adoption or contribute to policy reversal.

This study aims to fill these gaps by examining sociodemographic disparities in cannabis-cigar/cigarillo co-use among adult cannabis users, and by comparing cannabis product preferences and spending patterns between co-users and cannabis-only users. Using data from a national longitudinal survey of adult cannabis users, we provide, to our knowledge, the first comprehensive analyses of these dynamics in a representative adult sample. By addressing gaps in knowledge on disparities, product preferences, and economic behaviors,

this research advances our understanding of cannabis-cigar/cigarillo co-use, updates the evidence base to reflect the current marketplace, and informs ongoing policy debates.

Methods

Data and setting

We drew on a nationally representative sample of non-institutionalized U.S. adults from the IPSOS Knowledge Panel who reported cannabis use. Eligibility requirements included: (1) being at least 21 years old, (2) residing in the United States, and (3) reporting recreational cannabis use within the past 30 days. The final analytic sample consisted of 1,525 participants, of whom 747 reported using cannabis for both recreational and medical purposes and 778 reported exclusive recreational use. The survey gathered detailed information on cannabis consumption patterns, co-use with other substances (including cigars/cigarillos), and sociodemographic characteristics such as age and education. To ensure national representativeness of adult cannabis users, survey weights are provided by Ipsos who constructed them based on the 2022 National Survey on Drug Use and Health (NSDUH) data.

Respondents also reported their cannabis expenditures by product type. Cannabis product types included flower (dried cannabis for smoking), prerolls (ready-made joints or blunts), edibles (cannabis-infused foods or beverages), prefilled cartridges (vape cartridges containing cannabis oil), concentrates (high-potency extracts such as wax or resin), topicals (cannabis-infused creams or lotions), and an “other” category for products not captured in these groups. These data enabled us to estimate cannabis-cigar/cigarillo co-use prevalence, examine sociodemographic correlates of cigar/cigarillo use among cannabis users, analyze associations with cannabis product preferences, and evaluate differences in cannabis spending.

Measures

Sociodemographic correlates of cannabis-cigar/cigarillo co-use: The outcome variable was cannabis-cigar/cigarillo co-use. In the survey, participants self-reported their past 30-day cigar/cigarillo use, which was coded as a binary indicator (1 = any use; 0 = none). Explanatory variables included a consistent set of sociodemographic characteristics. These covariates captured age in years, sex (female, male as reference), race (Black, non-Hispanic; Other, non-Hispanic; Hispanic; 2+ Races, non-Hispanic; White, non-Hispanic as reference), annual household income (\$10,000–\$24,999, \$25,000–\$49,999, \$50,000–\$74,999, \$75,000–\$99,999, \$100,000–\$149,999, \$150,000 or more, less than \$10,000 as reference), education (High school graduate, Some college or associate’s degree, Bachelor’s degree or higher, no high school diploma as reference), employment status (Working part time, Not working, Working full time as reference), and metropolitan status (Living in a metropolitan area, Living in non-metropolitan area as reference, based on standard geographic classifications) (Bureau, 2026).

Product-specific cannabis expenditures and cannabis-cigar/cigarillo co-use: The outcome variables are product-specific categorical cannabis expenditures. In the survey,

respondents reported both their past 30-day total monthly expenditures on cannabis and the percentage across product type, including flower, prerolls, edibles, prefilled cartridges, concentrates, topicals, and other products. From these reports, we generated binary indicators of product-specific spending (1 = any positive expenditure reported for a given product type in the past 30 days; 0 = none) to examine variation across product categories. The primary explanatory variable was cannabis–cigar/cigarillo co-use (1 = any past 30-day use; 0 = none). All models controlled for the same set of sociodemographic variables described above.

Total monthly cannabis expenditure and cannabis-cigar/cigarillo co-use: The outcome variable is total monthly cannabis expenditure, measured as a continuous variable (U.S. dollars) based on self-reported past 30-day spending. The primary explanatory variable was cannabis–cigar/cigarillo co-use (1 = any past 30-day use; 0 = none). The same sociodemographic covariates described above are used as control variables. Controlling for these factors ensured that observed associations between cannabis-cigar/cigarillo co-use and cannabis expenditures were not driven by underlying demographic or socioeconomic differences. We evaluated multicollinearity among these predictors using variance inflation factors (VIFs), and all VIFs were well below accepted thresholds (maximum VIF = 5.34), indicating no evidence of problematic collinearity.

Analytical methods

We conducted three sets of regression analyses to address the study objectives. First, we used a logistic regression model to examine sociodemographic correlates of cannabis-cigar/cigarillo co-use among adult recreational cannabis users. The dependent variable was cigar/cigarillo use (yes/no), with age, gender, race and ethnicity, education, income, employment status, and metropolitan residence entered as covariates. The selection of covariates is consistent with prior studies examining tobacco and cannabis use behaviors (Ma et al., 2025a, 2025b; Xu et al., 2025).

Second, we evaluated the association between cannabis-cigar/cigarillo co-use and product-specific cannabis expenditures. For each product category—flower, prerolls, edibles, prefilled cartridges, concentrates, topicals, and other products—we estimated a separate logistic regression model with the binary outcome indicating any positive spending on that category in the past 30 days. Each model included cannabis-cigar/cigarillo co-use as the key explanatory variable, controlling for the same sociodemographic covariates.

Finally, we analyzed total monthly cannabis expenditure using a linear ordinary least squares (OLS) regression model. Total monthly cannabis spending was constructed as a continuous variable in U.S. dollars from self-reported monthly cannabis expenditures and served as the dependent variable. The model specification included cannabis-cigar/cigarillo co-use as the primary explanatory variable and adjusted for the same sociodemographic controls.

All analyses incorporated survey weights to account for the sampling design and ensure national representativeness. The robust standard errors were used and we reported odds ratios with confidence intervals in the result tables.

Results

Table 1 presents the summary statistics for the variables used for analyses in our analytic sample of 1,524 individuals. Cannabis–cigar/cigarillo co-use among cannabis users is relatively uncommon, with 8.26% of respondents reporting current co-use and 91.74% reporting no co-use. Based on survey weights, cannabis–cigar/cigarillo co-use corresponds to an estimated 126,000 adults nationwide. Cannabis product use is heterogeneous and skewed toward traditional forms: flower (62.07%) and edibles (50.40%) are most prevalent; prefilled cartridges (37.33%) and pre-rolls (24.37%) are also common, whereas concentrates (14.13%), topicals (6.31%), and other products (2.27%) are comparatively rare. Panel B indicates substantial dispersion in spending, with mean total cannabis expenditures of \$136.76 (SD = 190.30), consistent with a right-skewed distribution of purchasing intensity. Table 1 also provides detail on the sociodemographic and economic composition of the sample, showing a predominantly White, non-Hispanic, metro-based population with diverse income and education levels. Additional descriptive comparisons of product-type use and expenditure between co-users and non-co-users are presented in Appendix Table A6.

Table 2 presents the logistic regression results examining sociodemographic correlates of cannabis–cigar/cigarillo co-use among U.S. adult recreational cannabis users ($N = 1,524$). Compared with White, non-Hispanic cannabis users, Black, non-Hispanic users have more than five times higher odds of also using cigars/cigarillos (OR = 5.34, $p < 0.001$). Compared with individuals without a high school diploma, cannabis users with some college or an associate degree (OR = 0.33, $p < 0.01$) and those with a bachelor's degree or higher (OR = 0.20, $p < 0.01$) have significantly lower odds of cannabis–cigar/cigarillo co-use. Age is significantly associated with lower odds of co-use (OR = 0.98, $p < 0.05$), while gender, income, employment, and metropolitan status are not statistically significant predictors. Table A4 presents sensitivity analyses that incorporate state-level variation and cannabis legal status. The results are highly consistent with the primary findings reported in Table 2.

Table 3 reports logistic regression results on associations between sociodemographic characteristics and preferences for seven major cannabis product categories, including flowers, edibles, prerolls, prefilled cartridges, topicals, concentrates, and other cannabis products. Co-use of cigars/cigarillos is significantly associated with higher odds of using flowers (OR = 2.16, $p < 0.05$), prerolls (OR = 2.05, $p < 0.01$), topical use (OR = 2.10, $p < 0.05$), but shows no significant differences for concentrates or other products. Detailed estimates for demographic and socioeconomic characteristics are shown in Tables A1 and A2. Black, non-Hispanic users show higher odds of choosing flowers (OR = 2.62, $p < 0.001$) but lower odds of selecting edibles (OR = 0.60, $p < 0.01$) and prefilled cartridges (OR = 0.61, $p < 0.05$). Age is negatively associated with preroll (OR = 0.98, $p < 0.001$), prefilled cartridge (OR = 0.98, $p < 0.001$), and concentrate use (OR = 0.97, $p < 0.001$), while women are more likely than men to choose edibles (OR = 1.74, $p < 0.001$) and topicals (OR = 2.17, $p < 0.01$). Table A5 shows that the inclusion of state-level variation yields estimates that are highly consistent with those reported in Table 3. The positive associations between cannabis–cigar/cigarillo co-use and preferences for flower, preroll, and topical products remain statistically significant, while associations with other cannabis forms remain non-significant.

Respondents with a bachelor's degree or higher are more likely to choose edibles (OR = 2.75, $p < 0.001$) but less likely to prefer flowers (OR = 0.47, $p < 0.05$) and concentrates (OR = 0.36, $p < 0.01$). Compared with those working full-time, participants who were not working had significantly higher odds of choosing prerolls (OR = 1.49, $p < 0.05$), but no differences for flowers, edibles, or prefilled cartridges. Those working part-time did not differ significantly from full-time workers across the four products. For flower use, higher household income is associated with lower odds of preference compared to respondents with income below \$10,000. In contrast, higher income increases the odds of preferring edibles but reduced the odds of preferring concentrates. No significant associations are observed for metro versus non-metro residence.

Table 4 presents regression results examining cannabis expenditure in relation to cannabis-cigar/cigarillo co-use and sociodemographic characteristics. Cannabis-cigar/cigarillo co-use is associated with approximately \$73 higher cannabis expenditure compared with cannabis-only use ($b = 72.83$, $p < 0.01$). Detailed estimates for demographic and socioeconomic characteristics are provided in Table A3. Income shows a generally negative association, with the largest and most significant reduction observed for households earning \$75,000–\$99,999 ($b = -77.38$, $p < 0.05$). Compared with White non-Hispanic respondents, Black non-Hispanic ($b = 72.17$, $p < 0.01$) and Hispanic respondents ($b = 42.55$, $p < 0.05$) report significantly higher cannabis expenditure. Higher education levels are consistently linked to lower spending, with the strongest negative association among those with a bachelor's degree or higher ($b = -95.46$, $p < 0.001$). Age is negatively associated with cannabis expenditure ($b = -0.91$, $p < 0.05$). Employment status also matters: part-time workers ($b = -47.13$, $p < 0.01$) and those not working ($b = -32.78$, $p < 0.05$) spend less compared with full-time workers. Gender and metropolitan residence are not significantly associated with expenditure.

Discussions

Our study provides new evidence on the co-use of cigars/cigarillos and cannabis among U.S. adult recreational cannabis users. We found that approximately 8% of adult cannabis recreational users in the U.S. also reported cigar/cigarillo use, with pronounced sociodemographic disparities. Although the prevalence of cannabis–cigar/cigarillo co-use is modest, the weighted estimate indicates that this subgroup represents more than 126,000 adults nationally, which reflects a meaningful population burden given the elevated cigar/cigarillo exposure.

Black, non-Hispanic adult cannabis users were significantly more likely to engage in cannabis–cigar/cigarillo co-use. Adult cannabis users with lower educational attainment also had significantly higher likelihood of co-use. These patterns parallel long-standing disparities in cigar use or cannabis/tobacco co-use observed in national surveillance (Corey et al., 2014; Delnevo et al., 2017; Diaby et al., 2025; Richardson et al., 2013; Schauer et al., 2016; Strong et al., 2018). Moreover, consistent with earlier studies that emphasized higher rates of co-use of cannabis and tobacco among young adults, our results show that younger ages are associated with higher odds of cigars/cigarillos and cannabis co-use (Glasser et al., 2025; Ross et al., 2020). Considering the compounded risks of cannabis and cigar/cigarillo

use, the sociodemographic disparities observed in the co-use behaviors underscore the need for targeted prevention and cessation programs that address both nicotine and cannabis, particularly within Black communities, among younger adults, and among adults with lower educational attainment.

Our findings suggest that co-use of cigars/cigarillos and cannabis are associated with higher odds of using flowers and pre-rolls (i.e. joints), which are also often consumed *via* smoking (Bélanger et al., 2013; Kong et al., 2018; Peters et al., 2016; Pike Moore et al., 2025; Schauer et al., 2017; Timberlake et al., 2007). These preferences provide corroborating quantitative evidence to the existing qualitative information that common administration modality plays a significant role in product or form choices among cannabis and tobacco users (Ross et al., 2020; Schauer et al., 2016). This finding also highlights that cigar/cigarillo and cannabis users are at elevated risks due to consuming both products through smoking, which lead to a large number of adverse health consequences. Together, these results underscore the importance of targeted prevention strategies that address substance use among co-users of cigars/cigarillos and cannabis.

We also found that cannabis–cigar/cigarillo co-users reported significantly higher cannabis expenditures than cannabis-only users, after adjusting for socioeconomic and demographic characteristics. This spending pattern is consistent with prior evidence linking tobacco involvement with greater cannabis consumption intensity (Ramo et al., 2012; Schauer et al., 2015; Timberlake et al., 2007). We also discovered that compared with White, non-Hispanic cannabis users, Black, non-Hispanic and Hispanic cannabis users spend more on cannabis. Considering the high co-use and blunt use rates among Black, non-Hispanic and Hispanic populations, co-users of these race/ethnicity backgrounds face significantly higher financial burdens due to substance use compared to others. Therefore, addressing co-use of cigars/cigarillos and cannabis among these groups will have significant positive impacts not only on their health but also overall wellbeing and financial status (McClure et al., 2025; Sanchez et al., 2025; Smith et al., 2024).

This study has several limitations. First, the survey did not specifically ask about blunt use and as a result the estimated co-use prevalence may not fully capture simultaneous use or blunt use and underestimate the co-use prevalence. Second, the cross-sectional design of our survey restricts our ability to draw causal inferences. Future longitudinal analyses are needed to establish temporal relationships between cigar use and cannabis behaviors. Third, although the sample is nationally representative of adult cannabis users for recreational use, findings may not generalize to younger populations or medical cannabis users. Fourth, expenditure measures are based on self-reported past 30-day spending and product distribution, which may be subject to recall bias and introduce measurement error. Finally, while we adjusted for respondents' state of residence to capture broad geographic differences, the dataset does not include detailed state-level cannabis or tobacco policy measures. As a result, future studies may incorporate detailed cannabis and tobacco policy measures to better account for state-level regulatory variation that may influence co-use behaviors and spending patterns.

In conclusion, this study advances the evidence base on the cannabis-cigar/cigarillo co-use by identifying sociodemographic disparities, documenting product preferences, and quantifying spending differences. These insights not only update prior descriptive findings but also carry implications for both tobacco and cannabis regulatory frameworks. Future research should focus on developing targeted interventions for co-users of cigars/cigarillos and cannabis, who are more likely to consume substance *via* smoking and spend more on substance than others. By doing so, scholars and policymakers can better anticipate and mitigate the compounded risks associated with co-use in a rapidly evolving substance use landscape.

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Data availability statement

The dataset used in this analysis is proprietary survey data provided by Ipsos Knowledge Panel and cannot be publicly shared due to licensing restrictions.

Appendix

Table A1.

Associations between sociodemographic and socioeconomic characteristics and cannabis product preferences among U.S. adult recreational cannabis users (part 1).

	Odds ratio			
	(1)	(2)	(3)	(4)
	Flower	Edible	Preroll	Prefilled
Demographics				
Age	1.006 (0.005)	1.007 (0.005)	0.978 ^{***} (0.005)	0.977 ^{***} (0.005)
Gender (ref: Male)				
Female	0.774 (0.105)	1.736 ^{***} (0.222)	1.239 (0.182)	1.009 (0.133)
Race/Ethnicity (ref: White, Non-Hispanic)				
Black, Non-Hispanic	2.636 ^{***} (0.614)	0.600 ^{**} (0.118)	1.324 (0.317)	0.610 [*] (0.135)
Other, Non-Hispanic	1.026 (0.406)	0.968 (0.387)	0.653 (0.306)	0.877 (0.398)
Hispanic	0.838 (0.170)	0.924 (0.171)	1.381 (0.286)	1.501 [*] (0.288)
2+ Races, Non-Hispanic	0.935 (0.356)	1.163 (0.386)	1.795 (0.592)	1.736 (0.510)
Education (ref: No high school diploma or GED)				

	Odds ratio			
	(1)	(2)	(3)	(4)
	Flower	Edible	Preroll	Prefilled
High school graduate (high school diploma or the equivalent GED)	1.162 (0.415)	0.871 (0.253)	0.838 (0.251)	0.929 (0.275)
Some college or associate's degree	0.821 (0.287)	1.579 (0.455)	0.952 (0.282)	1.064 (0.310)
Bachelor's degree or higher	0.522 (0.189)	2.766** (0.837)	1.041 (0.329)	1.112 (0.343)
Socioeconomic status				
Income (ref: less than \$10,000)				
\$10,000 to \$24,999	0.590 (0.244)	1.054 (0.346)	1.238 (0.448)	0.891 (0.287)
\$25,000 to \$49,999	0.535 (0.214)	0.818 (0.245)	1.544 (0.506)	0.640 (0.194)
\$50,000 to \$74,999	0.412* (0.166)	1.253 (0.385)	1.562 (0.528)	0.813 (0.247)
\$75,000 to \$99,999	0.658 (0.271)	1.213 (0.394)	1.207 (0.444)	0.836 (0.273)
\$100,000 to \$149,999	0.401* (0.162)	1.348 (0.431)	1.104 (0.402)	0.703 (0.229)
\$150,000 or more	0.302** (0.125)	1.917* (0.631)	1.173 (0.424)	0.841 (0.276)
Employment (ref: working full-time)				
Working part-time	0.818 (0.170)	1.083 (0.209)	1.083 (0.236)	0.708 (0.148)
Not working	0.881 (0.163)	0.883 (0.147)	1.508* (0.297)	0.898 (0.153)
Metropolitan (ref: non-metro)				
Metro	0.992 (0.202)	1.022 (0.194)	1.198 (0.255)	1.131 (0.221)
Cannabis use purpose (ref: medical & recreational)				
Recreational use	0.582*** (0.081)	0.969 (0.126)	1.086 (0.166)	0.679** (0.092)
Constant	5.278** (2.779)	0.319** (0.136)	0.368* (0.166)	2.212 (0.938)
Observations	1524	1524	1524	1524

Exponentiated coefficients; Standard errors in parentheses.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table A2.
Associations between sociodemographic and socioeconomic characteristics and cannabis product preferences among U.S. adult recreational cannabis users (part 2).

	Odds ratio		
	(1)	(2)	(3)
	Topical	Concentrate	Other
Demographics			
Age	1.006 (0.009)	0.973*** (0.007)	1.009 (0.014)
Gender (ref: Male)			
Female	2.005* (0.549)	1.216 (0.231)	1.097 (0.434)
Race/Ethnicity (ref: White, Non-Hispanic)			
Black, Non-Hispanic	0.897 (0.299)	0.758 (0.230)	0.886 (0.510)
Other, Non-Hispanic	1.565 (1.094)	0.476 (0.303)	0.827 (0.920)
Hispanic	0.995 (0.380)	1.503 (0.374)	0.760 (0.481)
2+ Races, Non-Hispanic	1.406 (0.717)	1.260 (0.509)	1.070 (0.815)
Education (ref: No high school diploma or GED)			
High school graduate (high school diploma or the equivalent GED)	0.446 (0.216)	0.416** (0.148)	1.026 (0.490)
Some college or associate's degree	0.592 (0.282)	0.609 (0.216)	0.754 (0.349)
Bachelor's degree or higher	0.460 (0.245)	0.396* (0.157)	– –
Socioeconomic status			
Income (ref: Less than \$10,000)			
\$10,000 to \$24,999	1.092 (0.657)	0.877 (0.362)	0.489 (0.464)
\$25,000 to \$49,999	0.778 (0.433)	0.938 (0.360)	0.585 (0.444)
\$50,000 to \$74,999	1.366 (0.770)	1.131 (0.442)	1.001 (0.722)
\$75,000 to \$99,999	1.017 (0.650)	0.642 (0.278)	0.579 (0.553)
\$100,000 to \$149,999	0.707 (0.434)	0.405 (0.188)	0.260 (0.236)
\$150,000 or more	1.277	0.848	0.237

	Odds ratio		
	(1)	(2)	(3)
	Topical	Concentrate	Other
	(0.750)	(0.369)	(0.205)
Employment (ref: working full-time)			
Working part-time	0.835	0.986	1.151
	(0.332)	(0.268)	(0.761)
Not working	0.836	0.978	1.792
	(0.269)	(0.240)	(0.863)
Metropolitan (ref: non-metro)			
Metro	1.604	0.838	0.618
	(0.571)	(0.214)	(0.296)
Cannabis use purpose (ref: medical & recreational)			
Recreational use	0.524 *	0.614 *	1.016
	(0.144)	(0.122)	(0.417)
Constant	0.058 ***	1.591	0.043 **
	(0.041)	(0.840)	(0.043)
Observations	1524	1524	1436

Exponentiated coefficients; Standard errors in parentheses.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table A3.

Associations between sociodemographic and socioeconomic characteristics and cannabis expenditure among U.S. adult recreational cannabis users.

	(1)
	Cannabis expenditure
Demographics	
Age	-1.032 **
	(0.358)
Gender (ref: Male)	
Female	-2.949
	(11.257)
Race/Ethnicity (ref: White, Non-Hispanic)	
Black, Non-Hispanic	73.112 **
	(24.652)
Other, Non-Hispanic	6.616
	(21.045)
Hispanic	40.477
	(20.953)

	(1)
	Cannabis expenditure
2+ Races, Non-Hispanic	19.816 (20.878)
Education (ref: no high school diploma or GED)	
High school graduate (high school diploma or the equivalent GED)	-39.227 (27.967)
Some college or associate's degree	-55.045 [*] (27.327)
Bachelor's degree or higher	-85.431 ^{**} (29.429)
Socioeconomic status	
Income (ref: less than \$10,000)	
\$10,000 to \$24,999	-29.632 (37.177)
\$25,000 to \$49,999	-44.614 (36.141)
\$50,000 to \$74,999	-55.140 (37.645)
\$75,000 to \$99,999	-73.561 (37.865)
\$100,000 to \$149,999	-38.440 (40.117)
\$150,000 or more	-43.332 (39.178)
Employment (ref: working full-time)	
Working part-time	-45.322 ^{**} (14.170)
Not working	-39.676 ^{**} (13.153)
Metropolitan (ref: non-metro)	
Metro	-1.943 (20.226)
Cannabis use purpose (ref: medical & recreational)	
Recreational use	-55.659 ^{***} (12.938)
Constant	312.278 ^{***} (44.927)
Observations	1521

Standard errors in parentheses.

^{*} $p < 0.05$.

^{**} $p < 0.01$.

 $p < 0.001$.

Table A4.

Sensitivity analyses of sociodemographic correlates of cannabis-cigar/cigarillo co-use among U.S. adult recreational cannabis users, incorporating state-level variation and cannabis legal status.

	Odds ratio for cannabis-cigar/cigarillo co-use	
	(1)	(2)
Demographics		
Age	0.980 [*] (0.962, 0.997)	0.982 [*] (0.966, 0.999)
Gender (ref: Male)		
Female	0.692 (0.422, 1.135)	0.732 (0.449, 1.190)
Race/Ethnicity (ref: White, Non-Hispanic)		
Black, Non-Hispanic	6.127 ^{***} (3.358, 11.178)	5.543 ^{***} (3.256, 9.434)
Other, Non-Hispanic	4.104 (0.889, 18.954)	2.906 (0.802, 10.532)
Hispanic	2.016 (0.968, 4.196)	1.766 (0.861, 3.620)
2+ Races, Non-Hispanic	1.365 (0.362, 5.148)	1.092 (0.288, 4.141)
Education (ref: no high school diploma or GED)		
High school graduate (or the equivalent GED)	0.702 (0.322, 1.527)	0.689 (0.321, 1.480)
Some college or Associate's degree	0.326 ^{**} (0.144, 0.737)	0.362 [*] (0.161, 0.816)
Bachelor's degree or higher	0.217 ^{**} (0.078, 0.601)	0.233 ^{**} (0.089, 0.610)
Socioeconomic status		
Income (ref: Less than \$10,000)		
\$10,000 to \$24,999	0.943 (0.354, 2.515)	0.880 (0.351, 2.206)
\$25,000 to \$49,999	0.981 (0.396, 2.430)	1.031 (0.430, 2.475)
\$50,000 to \$74,999	0.737 (0.281, 1.931)	0.782 (0.319, 1.917)
\$75,000 to \$99,999	1.324 (0.450, 3.895)	1.313 (0.439, 3.928)
\$100,000 to \$149,999	0.420 (0.096, 1.844)	0.437 (0.102, 1.870)
\$150,000 or more	0.727 (0.228, 2.318)	0.565 (0.191, 1.676)

	Odds ratio for cannabis-cigar/cigarillo co-use	
	(1)	(2)
Employment (ref: Working full-time)		
Working part-time	1.229 (0.625, 2.416)	1.054 (0.568, 1.954)
Not working	0.807 (0.394, 1.651)	0.802 (0.397, 1.618)
Metropolitan (ref: Non-Metro)		
Metro	1.056 (0.542, 2.056)	0.887 (0.468, 1.684)
Cannabis use purpose (ref: Medical & Recreational)		
Recreational use	0.878 (0.531, 1.449)	0.906 (0.556, 1.477)
Constant	2.214 (0.132, 37.122)	0.895 (0.206, 3.889)
Observations	1318	1524

Notes: Column (1) accounts for state-level variation, and column (2) adds an indicator for cannabis legal status (fully legal, mixed, illegal). Exponentiated coefficients; 95% confidence intervals are shown in parentheses.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table A5.

Associations between cannabis-cigar/cigarillo co-use and cannabis product preferences among U.S. adult recreational cannabis users (with state-level variation).

	Odds ratio			
	(1)	(2)	(3)	(4)
	Flower	Edible	Preroll	Prefilled
Cannabis-cigar/cigarillo co-use	2.211 ** (1.217, 4.016)	1.082 (0.677, 1.727)	2.912 *** (1.716, 4.943)	1.217 (0.744, 1.991)
Observations	1516	1520	1479	1514
	(5)	(6)	(7)	
	Topical	Concentrate	Other	
	2.176 * (1.076, 4.402)	1.138 (0.614, 2.109)	0.767 (0.147, 3.992)	
Observations	1370	1421	980	

Notes: Exponentiated coefficients; All estimates are adjusted for demographic and socioeconomic characteristics. 95% confidence intervals are shown in parentheses.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

Table A6.
Cannabis spending share and expenditure by product type among co-users and non-co-users.

	Co-users	Non co-users
Flower (%)	83.33	61.82
Edibles (%)	39.17	52.71
Prerolls (%)	35.83	21.87
Prefilled (%)	37.50	33.19
Topicals (%)	13.33	5.70
Concentrates (%)	17.50	12.25
Other (%)	1.67	2.49
Cannabis expenditure (\$)	239.67	119.10

References

- Agrawal A, & Lynskey MT (2009). Tobacco and cannabis co-occurrence: Does route of administration matter? *Drug and Alcohol Dependence*, 99(1–3), 240–247. 10.1016/j.drugalcdep.2008.08.007 [PubMed: 18926646]
- Agrawal A, Budney AJ, & Lynskey MT (2012). The co-occurring use and misuse of cannabis and tobacco: A review. *Addiction (Abingdon, England)*, 107(7), 1221–1233. 10.1111/j.1360-0443.2012.03837.x [PubMed: 22300456]
- Badiani A, Boden JM, De Pirro S, Fergusson DM, Horwood LJ, & Harold GT (2015). Tobacco smoking and cannabis use in a longitudinal birth cohort: Evidence of reciprocal causal relationships. *Drug and Alcohol Dependence*, 150, 69–76. 10.1016/j.drugalcdep.2015.02.015 [PubMed: 25759089]
- Bélanger RE, Marclay F, Berchtold A, Saugy M, Cornuz J, & Suris J-C (2013). What extent does adding tobacco to cannabis expose young users to nicotine? *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 15(11), 1832–1838. To 10.1093/ntr/ntt063 [PubMed: 23674840]
- Bureau UC (2026). About Metropolitan and Micropolitan statistical areas. *Census.Gov*. <https://www.census.gov/programs-surveys/metro-micro/about.html>
- Chen-Sankey J, La Capria K, Glasser A, Padon AA, Moran MB, Wagoner KG, Jackson KM, & Berg CJ (2024). Associations between e-cigarette marketing exposure and vaping nicotine and cannabis among U.S. adults, 2021. *Addictive Behaviors*, 157, 108090. 10.1016/j.addbeh.2024.108090 [PubMed: 38880059]
- Chu A, Chaiton M, Kaufman P, Goodwin RD, Lin J, Hindocha C, Goodman S, & Hammond D. (2023). Co-use, simultaneous use, and mixing of cannabis and tobacco: A cross-national comparison of Canada and the US by cannabis administration type. *International Journal of Environmental Research and Public Health*, 20(5), 4206. 10.3390/ijerph20054206 [PubMed: 36901216]
- Cohn AM, & Chen S. (2022). Age groups differences in the prevalence and popularity of individual tobacco product use in young adult and adult marijuana and tobacco co-users and tobacco-only users: Findings from Wave 4 of the population assessment of tobacco and health study. *Drug and Alcohol Dependence*, 233, 109278. 10.1016/j.drugalcdep.2022.109278 [PubMed: 35151023]
- Cohn AM, Johnson AL, Fryer CS, & Villanti AC (2018). Marijuana use predicts onset of current little cigar use in a national sample of US young adults. *Drug and Alcohol Dependence*, 190, 235–241. 10.1016/j.drugalcdep.2018.01.020 [PubMed: 30064060]
- Committee on Patterns of Use and Health Effects of “Premium Cigars” and Priority Research, Board on Population Health and Public Health Practice, Health and Medicine Division, & The National Academies of Sciences, Engineering, and Medicine. (2022). *Premium cigars: Patterns of use,*

marketing, and health effects (Teutsch SM, Geller AB, & Mead AM, Eds.; p. 26421). National Academies Press. 10.17226/26421

- Corey CG, King BA, Coleman BN, Delnevo CD, Husten CG, Ambrose BK, & Apelberg BJ, Centers for Disease Control and Prevention. (2014). Little filtered cigar, cigarillo, and premium cigar smoking among adults—United States, 2012–2013. *MMWR. Morbidity and Mortality Weekly Report*, 63(30), 650–654. [PubMed: 25078654]
- Degenhardt L, Dierker L, Chiu WT, Medina-Mora ME, Neumark Y, Sampson N, Alonso J, Angermeyer M, Anthony JC, Bruffaerts R, de Girolamo G, de Graaf R, Gureje O, Karam AN, Kostyuchenko S, Lee S, Lépine J-P, Levinson D, Nakamura Y, ... Kessler RC (2010). Evaluating the drug use “gateway” theory using cross-national data: Consistency and associations of the order of initiation of drug use among participants in the WHO World Mental Health Surveys. *Drug and Alcohol Dependence*, 108(1–2), 84–97. 10.1016/j.drugalcdep.2009.12.001 [PubMed: 20060657]
- Delnevo CD, Giovenco DP, & Miller Lo EJ (2017). Changes in the Mass-merchandise Cigar Market since the Tobacco Control Act. *Tobacco Regulatory Science*, 3(2 Suppl 1), S8–S16. 10.18001/trs.3.2(suppl1).2 [PubMed: 28317004]
- Diaby M, Agbonlahor O, Fennell BS, Hart JL, & Mattingly DT (2025). Disparities in use modalities among adults who currently use cannabis, 2022–2023. *Journal of Cannabis Research*, 7(1), 26. 10.1186/s42238-025-00283-x [PubMed: 40380341]
- Fairman BJ, & Dutra LM (2025). Cannabis and tobacco co-use and cannabis dependence: A survey of US adults in legal recreational cannabis markets. *Substance Use & Misuse*, 60(13), 1955–1963. 10.1080/10826084.2025.2524050 [PubMed: 40591807]
- Glasser AM, Uriarte C, King Jensen J, Sterling K, Shang C, Hammond D, & Villanti AC (2025). Temporal trends in young adult cannabis and tobacco use in states with different cannabis policies. *Cannabis (Albuquerque, N.M.)*, 8(2), 98–111. 10.26828/cannabis/2025/000288 [PubMed: 40909145]
- Gobbi G, Atkin T, Zytynski T, Wang S, Askari S, Boruff J, Ware M, Marmorstein N, Cipriani A, Dendukuri N, & Mayo N. (2019). Association of cannabis use in adolescence and risk of depression, anxiety, and suicidality in young adulthood: A systematic review and meta-analysis. *JAMA Psychiatry*, 76(4), 426–434. 10.1001/jamapsychiatry.2018.4500 [PubMed: 30758486]
- Gowin JL, Ellingson JM, Karoly HC, Manza P, Ross JM, Sloan ME, Tanabe JL, & Volkow ND (2025). Brain function outcomes of recent and lifetime cannabis use. *JAMA Network Open*, 8(1), e2457069. 10.1001/jamanetworkopen.2024.57069 [PubMed: 39874032]
- Hasin DS, Saha TD, Kerridge BT, Goldstein RB, Chou SP, Zhang H, Jung J, Pickering RP, Ruan WJ, Smith SM, Huang B, & Grant BF (2015). Prevalence of marijuana use disorders in the United States between 2001–2002 and 2012–2013. *JAMA Psychiatry*, 72(12), 1235–1242. 10.1001/jamapsychiatry.2015.1858 [PubMed: 26502112]
- Hindocha C, & McClure EA (2021). Unknown population-level harms of cannabis and tobacco co-use: If you don’t measure it, you can’t manage it. *Addiction*, 116(7), 1622–1630. 10.1111/add.15290 [PubMed: 33047862]
- Jensen JK, Ganz O, Tomaino M, Glasser AM, Sterling K, Delnevo CD, & Manderski MTB (2025). Patterns of blunt and cigar use in the United States, 2015–2019. *Nicotine & Tobacco Research: official journal of the Society for Research on Nicotine and Tobacco*, 27 (3), 511–516. 10.1093/ntr/ntae209. [PubMed: 39234858]
- Kong G, Cavallo DA, Goldberg A, LaVallee H, & Krishnan-Sarin S. (2018). Blunt use among adolescents and young adults: Informing cigar regulations. *Tobacco Regulatory Science*, 4(5), 50–60. 10.18001/TRS.4.5.5
- Ma S, Shang C, Do VV, Huang J, Pechacek TF, & Weaver SR (2025a). The impacts of product characteristics and regulatory environment on smokers’ preferences for tobacco and alcohol: Evidence from a volumetric choice experiment. *PloS One*, 20(3), e0320023. 10.1371/journal.pone.0320023 [PubMed: 40073034]
- Ma S, Yang Q, Ahn S, Park H, He Y, Bridges JFP, & Shang C. (2025b). Cost comparison and spending on tobacco products: Evidence from a nationally representative sample of adult e-cigarette users. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 27(8), 1367–1375. 10.1093/ntr/ntae250 [PubMed: 39450424]

- McClure EA, Piper ME, Crotty Alexander LE, Burnham EL, Freeman TP, Galiatsatos P, Lang AE, Lee DC, Leone FT, Melzer AC, Mermelstein RJ, Montgomery L, Rabin RA, Smith DM, St. Helen G, Weinberger AH, & Kathuria H. (2025). Effects of inhaled tobacco and cannabis co-use on respiratory health and tobacco cessation: An official American Thoracic Society Research Statement. *American Journal of Respiratory and Critical Care Medicine*, 211(11), 2021–2042. 10.1164/rccm.202507-1792ST [PubMed: 40845321]
- Meier MH, Caspi A, Ambler A, Harrington H, Houts R, Keefe RSE, McDonald K, Ward A, Poulton R, & Moffitt TE (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences of the United States of America*, 109(40), E2657–E2664. 10.1073/pnas.1206820109 [PubMed: 22927402]
- Meier E, & Hatsukami DK (2016). A review of the additive health risk of cannabis and tobacco co-use. *Drug and Alcohol Dependence*, 166, 6–12. 10.1016/j.drugalcdep.2016.07.013 [PubMed: 27476751]
- National Academies of Sciences, Engineering, and Medicine Committee. (2024). cannabis policy impacts public health and health equity (Teutsch S, Hurd Y, & Boyle E, Eds., p. 27766). National Academies Press. 10.17226/27766
- Nguyen N, Islam S, Llanes KD, Koester KA, & Ling PM (2024). Classification of patterns of tobacco and cannabis co-use based on temporal proximity: A qualitative study among young adults. *Addictive Behaviors*, 152, 107971. 10.1016/j.addbeh.2024.107971 [PubMed: 38281461]
- Pacula RL, & Smart R. (2017). Medical marijuana and marijuana legalization. *Annual Review of Clinical Psychology*, 13(1), 397–419. 10.1146/annurev-clinpsy-032816-045128
- Peters EN, Schauer GL, Rosenberry ZR, & Pickworth WB (2016). Does marijuana “blunt” smoking contribute to nicotine exposure?: Preliminary product testing of nicotine content in wrappers of cigars commonly used for blunt smoking. *Drug and Alcohol Dependence*, 168, 119–122. 10.1016/j.drugalcdep.2016.09.007 [PubMed: 27639129]
- Pike Moore S, Masyn K, Trapl E, Fryer CS, Lee E, Gunzler D, Shang C, & Sterling K. (2025). Prevalence of blunt and hemp wrap use among young adults in the United States, 2022. *Substance Use & Misuse*, 60(1), 142–147. 10.1080/10826084.2024.2403124 [PubMed: 39340772]
- Pike Moore S, Osborn C, Koopman Gonzalez S, Quisenberry A, Klein EG, Kaur M, Suratkal J, & Trapl E. (2022). Flavour loyalty may predict cessation or substitution following a cigarillo flavour ban among young adults in the USA. *Tobacco Control*, 31(Suppl 3), s206–s213. 10.1136/tc-2022-057487 [PubMed: 36328462]
- Quader ZS, Roehler DR, Vivolo-Kantor AM, & Ko JY (2025). Routes of marijuana use—Behavioral risk factor surveillance system, 22 U.S. States and Two Territories, 2022. *MMWR. Morbidity and Mortality Weekly Report*, 74(12), 198–204. 10.15585/mmwr.mm7412a1 [PubMed: 40208833]
- Ramo DE, Liu H, & Prochaska JJ (2012). Tobacco and marijuana use among adolescents and young adults: A systematic review of their co-use. *Clinical Psychology Review*, 32(2), 105–121. 10.1016/j.cpr.2011.12.002 [PubMed: 22245559]
- Richardson A, Rath J, Ganz O, Xiao H, & Vallone D. (2013). Primary and dual users of little cigars/cigarillos and large cigars: Demographic and tobacco use profiles. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 15(10), 1729–1736. 10.1093/ntr/ntt053 [PubMed: 23645607]
- Ross JC, Sutfin EL, Suerken C, Walker S, Wolfson M, & Reboussin BA (2020). Longitudinal associations between marijuana and cigar use in young adults. *Drug and Alcohol Dependence*, 211, 107964. 10.1016/j.drugalcdep.2020.107964 [PubMed: 32251920]
- Sanchez JI, Fong RS, Hampilos K, Cooper ZD, & Middlekauff HR (2025). Blunt talk on “blunts”: The increasingly popular tobacco product that is potentially exacerbating tobacco-related health disparities. *Journal of General Internal Medicine*, 40(2), 443–447. 10.1007/s11606-024-08980-8 [PubMed: 39313669]
- Schauer GL, Berg CJ, Kegler MC, Donovan DM, & Windle M. (2015). Assessing the overlap between tobacco and marijuana: Trends in patterns of co-use of tobacco and marijuana in adults from 2003–2012. *Addictive Behaviors*, 49, 26–32. 10.1016/j.addbeh.2015.05.012 [PubMed: 26036666]
- Schauer GL, Berg CJ, Kegler MC, Donovan DM, & Windle M. (2016). Differences in tobacco product use among past month adult marijuana users and nonusers: Findings from the 2003–2012 National

- Survey on Drug Use and Health. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 18(3), 281–288. 10.1093/ntr/ntv093 [PubMed: 26009578]
- Schauer GL, Rosenberry ZR, & Peters EN (2017). Marijuana and tobacco co-administration in blunts, spliffs, and mulled cigarettes: A systematic literature review. *Addictive Behaviors*, 64, 200–211. 10.1016/j.addbeh.2016.09.001 [PubMed: 27654966]
- Smith DM, Nucci-Sack A, Shyhalla K, Viswanathan S, Burk RD, Diaz A, & Schlecht NF (2024). Tobacco-cannabis co-use and risk of substance use problems among Black and Hispanic adolescent and young adult females in New York City. *International Journal of Mental Health and Addiction*, 23(6), 4344–4361. 10.1007/s11469-024-01355-4
- Smith DM, O'Connor RJ, Wei B, Travers M, Hyland A, & Goniewicz ML (2020). Nicotine and toxicant exposure among concurrent users (co-users) of tobacco and cannabis. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 22(8), 1354–1363. 10.1093/ntr/ntz122 [PubMed: 31388679]
- Strong DR, Myers MG, Pulvers K, Noble M, Brikmanis K, & Doran N. (2018). Marijuana use among US tobacco users: Findings from wave 1 of the population assessment of tobacco health (PATH) study. *Drug and Alcohol Dependence*, 186, 16–22. 10.1016/j.drugalcdep.2017.12.044 [PubMed: 29529455]
- Timberlake DS, Haberstick BC, Hopper CJ, Bricker J, Sakai JT, Lessem JM, & Hewitt JK (2007). Progression from marijuana use to daily smoking and nicotine dependence in a national sample of U.S. adolescents. *Drug and Alcohol Dependence*, 88(2–3), 272–281. 10.1016/j.drugalcdep.2006.11.005 [PubMed: 17174040]
- Xu L, He Y, Park H, Zhang S, Ma S, & Shang C. (2025). How tax structures for retail cannabis shape cannabis use among youth and young adults: Evidence from a volumetric choice experiment. *European Journal of Health Economics*, 1–22. 10.1007/s10198-025-01875-3

Table 1.Characterization of a nationally representative sample of cannabis users ($N = 1524$).

Key variables	
	Frequency (%)
Cannabis-cigar/cigarillo co-use	120 (8.26%)
Cannabis use (past 30-day use)	
Topical	96 (6.31%)
Preroll	350 (24.37%)
Prefilled cartridge	511 (37.33%)
Flower	968 (62.07%)
Edible	787 (50.40%)
Concentrate	193 (14.13%)
Other	37 (2.27%)
	Mean (SD)/frequency (%)
Cannabis expenditures	136.76 (190.30)
Sociodemographic characteristics	
Age	42.86 (15.01)
Gender	
Male	846 (57.44%)
Female	678 (42.56%)
Race and ethnicity	
White, non-Hispanic	1051 (65.39%)
Black, non-Hispanic	192 (13.62%)
Other, non-Hispanic	32 (2.38%)
Hispanic	189 (14.06%)
2+ Races, non-Hispanic	60 (4.54%)
Household Income	
Less than \$10,000	81 (4.88%)
\$10,000 to \$24,999	160 (8.23%)
\$25,000 to \$49,999	278 (17.62%)
\$50,000 to \$74,999	258 (17.11%)
\$75,000 to \$99,999	189 (11.95%)
\$100,000 to \$149,999	254 (16.70%)
\$150,000 or more	304 (23.51%)
Education	
No high school diploma or GED	88 (6.29%)
High school graduate	361 (25.65%)
Some college or associate's degree	498 (33.96%)
Bachelor's degree or higher	577 (34.10%)
Employment	
Working full time	820 (59.16%)
Working part time	217 (13.93%)

Not working	487 (26.92%)
MSA Status	
Metro	1328 (87.50%)
Non-metro	196 (12.50%)
Cannabis use purpose	
Recreational use	822 (55.57%)
Medical & recreational	702 (44.43%)

Notes: All continuous variables are based on the full analytic sample ($N = 1,524$). Proportions are weighted, but number of observations are unweighted. Among 1,524 respondents, 717 reported using only one type of cannabis product, while 807 reported using two or more product types.

Table 2.

Multiple logistic regression analysis of sociodemographic correlates of cannabis-cigar/cigarillo co-use among U.S. adult recreational cannabis users ($N = 1524$).

	(1)
	Odds ratio for cannabis-cigar/cigarillo co-use
Demographics	
Age	0.982 [*] (0.966, 0.998)
Gender (ref: Male)	
Female	0.746 (0.458, 1.215)
Race/Ethnicity (ref: White, Non-Hispanic)	
Black, Non-Hispanic	5.383 ^{***} (3.169, 9.145)
Other, Non-Hispanic	2.487 (0.744, 8.312)
Hispanic	1.589 (0.770, 3.279)
2+ Races, Non-Hispanic	0.950 (0.244, 3.707)
Education (ref: No high school diploma or GED)	
High school graduate (or the equivalent GED)	0.652 (0.303, 1.406)
Some college or associate's degree	0.333 ^{**} (0.303, 1.406)
Bachelor's degree or higher	0.206 ^{**} (0.078, 0.542)
Socioeconomic status	
Income (ref: less than \$10,000)	
\$10,000 to \$24,999	0.893 (0.373, 2.139)
\$25,000 to \$49,999	1.047 (0.459, 2.384)
\$50,000 to \$74,999	0.791 (0.333, 1.880)
\$75,000 to \$99,999	1.225 (0.434, 3.458)
\$100,000 to \$149,999	0.434 (0.109, 1.727)
\$150,000 or more	0.516 (0.185, 1.439)

	(1)
	Odds ratio for cannabis-cigar/cigarillo co-use
Employment (ref: working full-time)	
Working part-time	1.123 (0.600, 2.099)
Not working	0.755 (0.390, 1.465)
Metropolitan (ref: non-metro)	
Metro	0.800 (0.420, 1.526)
Cannabis use purpose (ref: medical & recreational)	
Recreational use	0.859 (0.529, 1.395)
Constant	0.530 (0.160, 1.752)

Notes: Exponentiated coefficients; 95% confidence intervals are shown in parentheses.

*
 $p < 0.05$.

**
 $p < 0.01$.

 $p < 0.001$.

Table 3.

Associations between cannabis-cigar/cigarillo co-use and cannabis product preferences among U.S. adult recreational cannabis users.

	(1)	(2)	(3)	(4)
	Flower	Edible	Preroll	Prefilled
Cannabis-cigar/cigarillo co-use	2.130 [*] (1.190, 3.813)	1.084 (0.689, 1.706)	2.051 ^{**} (1.240, 3.394)	1.181 (0.732, 1.903)
Observations	1524	1524	1524	1524
	(5)	(6)	(7)	
	Topical	Concentrate	Other	
Cannabis-cigar/cigarillo co-use	2.028 [*] (1.032, 3.985)	1.051 (0.566, 1.950)	0.640 (0.144, 2.839)	
Observations	1524	1524	1436	

Notes: All estimates are adjusted for demographic and socioeconomic characteristics. Exponentiated coefficients; 95% confidence intervals are shown in parentheses.

^{*}
 $p < 0.05$

^{**}
 $p < 0.01$

^{***}
 $p < 0.001$.

Table 4.

Associations between cannabis-cigar/cigarillo co-use and cannabis expenditure among U.S. adult recreational cannabis users ($N = 1,521$).

	(1)
	Cannabis expenditure
Cannabis-cigar/cigarillo co-use	71.524 **
	(20.156, 122.892)

Notes: All estimates are adjusted for demographic and socioeconomic characteristics. Standard errors in parentheses.

*
 $p < 0.05$

**
 $p < 0.01$

 $p < 0.001$.