HHS Public Access

Author manuscript

Addict Behav. Author manuscript; available in PMC 2017 November 01.

Published in final edited form as:

Addict Behav. 2016 November ; 62: 35–41. doi:10.1016/j.addbeh.2016.05.021.

Correlates of current menthol cigarette and flavored other tobacco product use among U.S. young adults

Jessica Miller Rath, PhD, MPH, CHES, **Andrea C. Villanti, PhD, MPH**, **Valerie F. Williams, MA, MS**, **Amanda Richardson, PhD, MPH**, **Jennifer L. Pearson, PhD, MPH**, and **Donna M. Vallone, PhD, MPH**

1724 Massachusetts Ave NW Washington

Abstract

Background—Flavored and menthol tobacco products are particularly appealing to young adults. However, little is known about factors associated with their use in this population.

Purpose—To examine characteristics associated with using menthol cigarettes, flavored other tobacco products (OTP), and flavored e-cigarettes among young adults.

Methods—Using a nationally representative online sample of young adults (n=4,239) from the Truth Initiative Young Adult Cohort Study, mutually exclusive groups were created from the subset of current tobacco users (N=1,037) for users of menthol cigarettes (N=311; 30%), non-menthol cigarettes (N=426; 41%), flavored OTP only users (N=114; 11%), and non-flavored OTP only users (N=186; 18%) to examine factors of being in any one group. Data were collected in July 2012.

Results—In the full multivariable model, significant correlates of current menthol cigarette use were female gender (AOR=2.08), Black race (AOR=5.31), other race (AOR=2.72), Hispanic ethnicity (AOR=2.46) and self-identifying as a smoker, social smoker, or occasional smoker (AOR=10.42). Significant correlates of current flavored OTP use were younger age (18–24; AOR=3.50), self-identifying as a smoker, social smoker, or occasional smoker (AOR=30) and generalized anxiety (AOR=0.30).

Conclusions—This study highlights female gender, Blacks/other race/Hispanics, smokers, social smokers and sexual minorities as correlates of menthol cigarette use and younger age as a predictor of flavored OTP use. Restricting access to flavored tobacco products may be one intervention to help slow the tobacco epidemic, particularly among many of the most vulnerable groups—young women and racial and/or ethnic minorities.

COMPETING INTERESTS

The authors have no competing interests or conflicts to declare.

Background

Young adults are an increasingly important target for the tobacco industry.[1,2] Young adulthood is an important developmental period marked by transitions (e.g., leaving home and school), increased stress and pressure, identity exploration, and establishing health behaviors that will persist throughout adulthood.[3] It has also been shown to be a particularly salient time for progression to regular tobacco use.[4] Evidence suggests that use of menthol and flavored products can help facilitate initiation and establish use of tobacco products.[5–7] Although the Family Smoking Prevention and Tobacco Control Act banned candy and fruit flavors for cigarettes in 2009, menthol flavoring for cigarettes was exempted from this ban.[8] Moreover, other FDA-regulated tobacco products such as smokeless tobacco, as well as unregulated products such as some dissolvables, cigars and electronic cigarettes, feature candy or fruit flavor varieties. Thus, menthol and flavored tobacco products and e-cigarettes are readily available, despite the ban on cigarettes with characterizing flavors (except menthol) and rates of tobacco product/e-cigarette use labeled as flavored continue to rise in young adults.

Prior to the 2009 ban, past-30-day use of flavored cigarettes (excluding menthol) was estimated at 11.9% among young adult smokers.[9] In 2011, 18.5% of young adult tobacco users reported past 30-day use of flavored products.[10] Between 2004 and 2010, rates of menthol cigarette use increased among young adults aged 18 to 25, from 13.4% to 15.9%, despite a significant decrease in non-menthol cigarette use over this time period among this age group.[11,12] A high prevalence of flavored tobacco use in youth has also been presented in more recent studies.[13–15] It is important to note that other countries outside of the US have enacted more robust bans regarding flavored tobacco products some US cities are following that lead with their own flavor bans (such as New York City and Chicago within 500 feet of schools).[16–18]

Many non-cigarette and smokeless tobacco products are currently available in multiple flavors including apple, vanilla and banana split.[19] In fact, from 2010–2012, Swisher International introduced wine, grape, white grape and blueberry flavors to its Swisher Sweets line of little cigars and cigarillos, and Johnson Creek introduced cherry crush, java jolt and vivid vanilla as additional “smoke juices” for e-cigarettes.[20,21] A recent study confirms that the chemical-specific flavor sensory cues associated with fruit flavors in candy are the same as those found in tobacco products.[22] Despite the increased availability of flavored tobacco products and reported rise in menthol cigarette use, little is known about the factors which may be associated with using menthol, flavored, or using both types of tobacco products among young adults. Earlier findings from the Truth Initiative Young Adult Cohort Study indicates that younger adults, aged 18–24 years, were more likely to use flavored tobacco products (OR=1.89) as compared to those aged 25–34 years. Additionally, those with a high school education were less likely than those with some college education or more to use flavored products (OR=0.56).[10] The goal of the current study is to explore which factors may differentiate use of menthol, or flavored products among a nationally representative sample of young adults. Findings can help inform the FDA Center for Tobacco Products as they consider policy initiatives for menthol and other flavored tobacco products in an effort to reduce tobacco use initiation.

Methods

Participants

This study uses data from the Truth Initiative Young Adult Cohort Study which was designed to understand the trajectories of tobacco use in a young adult population. The detailed methods of this sample have been described elsewhere.[23] Briefly, the Truth Initiative Young Adult Cohort is comprised of a nationally representative sample of young adults ages 18–34 drawn from GfK's KnowledgePanel.® KnowledgePanel® includes adults ages 18 and older across both the online and offline populations in the U.S.[24] The 18–34-year age range was selected in order to be consistent with other Legacy research. For example, previous publications by the Legacy research group demonstrate differences between younger (18–24) and older (25–34) young adults.[25]

The cohort and panel were recruited via address-based sampling, a probability-based random sampling method that provides statistically valid representation of the U.S. population, including cell phone-only households. The validity of this methodology has been reported previously,[26,27] and KnowledgePanel® samples have been used broadly in the peer-reviewed medical literature.[28–31]

This study uses cross-sectional data collected as Wave 3 of the Truth Initiative Young Adult Cohort in July 2012 (N=4,239). The panel recruitment rate (RECR) for Wave 3 was 14.4%.[32] In 65.7% of the identified households, one member completed a core profile survey in which the key demographic information was collected (profile rate—PROR). For this study, only one panel member per household was selected at random to be part of the study sample and no members outside the panel were recruited. The response rate (COMR) was 46.2% and thus, the cumulative response rate (CUMRR1) was 4.4%. Active profiled adults are weighted to be representative of the U.S. population on age, gender, race, Hispanic ethnicity, language proficiency, region, metro status, education, household income, homeownership, and Internet access using post-stratification adjustments to offset any non-response or non-coverage bias. Of the 1,058 respondents who reported one or more days of tobacco product use in the past month (current users), 1,037 provided valid data on current menthol product use. These respondents were categorized into four mutually exclusive groups 1) menthol cigarettes users (N=311); 2) non-menthol cigarette users (N=426); 3) flavored other tobacco product only users (non-cigarette; N=114); and 4) non-flavored other tobacco product only users (noncigarette; N=186). In order to maintain these groups as mutually exclusive, the 108 users of both flavored and menthol products were classified as follows: 46 were not cigarette users and were classified in the flavored other tobacco products only group, 11 were menthol and flavored cigarette only users and are included in the menthol cigarette group given the ban on flavored cigarettes, 32 were users of both menthol cigarettes and other tobacco products (both flavored and unflavored) and are included in the menthol cigarette group because their characteristics most closely matched this group, 19 were users of both non-menthol cigarettes and other tobacco products (both flavored and unflavored) and are included in the non-menthol cigarette group because their characteristics most closely match this group (White, Non Hispanic, in the older age group with two smoking parents and self-identified as smokers). This study was approved by the

Independent Investigational Review Board, Inc., and online consent was collected from participants before survey self-administration.

Measures

Tobacco and Other Substance Use—Tobacco use was assessed for 10 tobacco products (cigarettes, cigars, little cigars, hookah, pipe, e-cigarettes, dip/snuff, chewing tobacco, snus and dissolvable tobacco products) using the following item: “which, if any, of the following tobacco or nicotine products have you ever used or tried?” Current use (past 30 days) of those 10 products was assessed from the question “during the last 30 days, on how many days have you used any of the following tobacco products?” Use of at least one product in the past 30 days is coded as current tobacco use. For each type of product reported as currently used, the brand of that product was assessed (“what brand of [insert product] do you typically use?”), as well as whether the product was “menthol”, “non-menthol or “flavored” (candy, fruit or alcoholic beverage flavored). Response options for the flavored items were “yes” or “no.”

Two categories of self-identified smoking status are included (smoker/social/occasional smoker versus ex-smoker/tried smoking/non-smoker). This item has been previously used by Robin Mermelstein.

Parent smoking during childhood was obtained by asking “did your parents or guardians smoke during your childhood?” “Neither of them” was the reference group for analysis versus “one or both of them.” This question was developed for the survey to understand tobacco environment.

Participants (ever tobacco users only) were asked “which tobacco products have you purchased on the internet?” Answer choices included all tobacco products (check all that apply) and an option to answer “I have not purchased any tobacco products on the internet.” Two categories were developed for “purchased” and “not purchased” tobacco products online. This is a new item developed to understand buying habits of tobacco products.

Information on other substance use was obtained from a question regarding how often, if ever, respondents currently use each of the following substances: alcohol, marijuana and other drugs (cocaine, heroin, ecstasy, meth, etc.). Information was collapsed into categories of “no” and “any current use” of other substances. This is a standard past 30 day measure.

Demographics—Demographic variables included age, dichotomized as 18–24 year olds and 25–34 year olds, gender, race/ethnicity (White non-Hispanic, Black non-Hispanic, Other non-Hispanic, Hispanic), educational attainment (less than high school, high school, some college or more), ratio of family income to the 2011 poverty threshold (<1, ≥1) and self-identified financial situation (don’t or just meet basic expenses, meet needs with a little left, live comfortably).

Other Personal Characteristics—Sexual minority status has been found to be associated with use of flavored products, specifically cigars.[33,34] Sexual identity was assessed using the following item[35], “Do you consider yourself to be (mark only one)”:

choices were adapted to include “transgender” as follows: “heterosexual or straight,” “homosexual or gay/lesbian,” “bisexual,” “transgender,” “other,” “don’t know/not sure.” The variable was dichotomized into two groups: heterosexual/straight and LGBT. Sensation seeking is psychological construct related to risk-taking which has been associated with a variety of substance use behaviors including tobacco use.[36] This item is included to explore whether high sensation seekers are more likely to use flavored or mentholated tobacco products. This characteristic was measured using an 8-item Brief Sensation Seeking Scale (BSSS-8).[36] For example “I like to do frightening things.” Respondents options ranged from “strongly disagree” to “strongly agree” on a 5-point Likert scale. Total scale scores range from 8–40 with higher score indicating more sensation seeking. Anxiety was measured by the GAD 2-item scale.[37,38] On a scale from “not at all” to “nearly every day,” respondents indicated how often over the last 2 weeks, they have been bothered by any of the following problems: “feeling nervous, anxious or on edge” and “not being able to stop or control worrying.” Scores ranged from 0–6. A score of 3 or above was considered anxious. Depression was measured using the PHQ 2 scale.[39] On a scale from “not at all” to “nearly every day,” respondents indicated how often over the last 2 weeks, they have been bothered by any of the following problems: “little interest or pleasure in doing things” and “feeling down, depressed or hopeless.” Scores ranged from 0–6. A score of 3 or above was considered depressed.

Tobacco Control Policy and Environment—State tobacco control policy has been highly effective in reducing youth and adult tobacco use; however the strength of tobacco control policy varies significantly across the nation. We included these factors as control variables in the multivariable analysis. Information on respondents’ state of residence allowed for the use of state tobacco policy factors as covariates: 1) total tax per cigarette pack (state + federal)[40]; 2) state-level per capita tobacco control expenditures rounded to the nearest cent (J. Huang, PhD, F.J. Chaloupka, PhD, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, unpublished data, 2011): and 3) level of state clean indoor air legislation as measured in percentage of state population covered as of 2012 across all US states and the District of Columbia.[41] We also included state smoking prevalence as another indicator of the effectiveness of all tobacco control efforts.[42,43] All state policy variables were treated as continuous.

Data Analysis

Data were analyzed for four distinct groups using p-values ($p<.05$) associated with the t-statistic; the menthol cigarette versus non-menthol cigarette categories and the flavored other tobacco product only versus non-flavored other tobacco product only categories (non-cigarette). All analyses were performed using Stata IC 13.1 and data were weighted to produce nationally representative prevalence estimates.[44] Active profiled adults are weighted to be representative of the U.S. population on age, gender, race, Hispanic ethnicity, language proficiency, region, metro status, education, household income, homeownership, and Internet access using post-stratification adjustments to offset any non-response or non-coverage bias. Bivariate analyses were carried out to test for associations between individual characteristics, selected variables, and two outcome variables: menthol cigarettes and flavored other tobacco products only. Variables were included in the models based on known

associations with tobacco use. The first set of bivariate comparisons were done within two specific groups—cigarette users and users of other (non-cigarette) tobacco products only. The second set of comparisons were done to inform the multivariable models and used the full group of current tobacco users as the denominator. Statistically significant factors ($p < 0.10$) of menthol cigarette and flavored other tobacco product only use from the second set of comparisons were included in the multivariable models. Age, race/ethnicity, and education were included as control variables in all models. Multivariable logistic regression models were used to estimate the influence of the independent variables on menthol cigarette use and flavored other tobacco product only use among all current tobacco users while adjusting for all other variables. Explanatory variables were added to the models as groups in a sequential manner: demographics, smoking-related variables, other personal characteristics and policy indicators. Separate models were run for each of the two dependent variables. Likelihood ratio (LR) tests were used to assess goodness of fit for all models.

Results

Among 4,239 respondents, 24.5% reported use of any tobacco product in the past 30 days (n=1,037, unweighted). Table 1 presents unweighted data on the comparison between the menthol cigarette users (n=311) and the non-menthol cigarette users (n=426) and a comparison between the flavored OTP only users (n=114) and the non-flavored OTP only users (n=186). The sample sizes in Table 1 are unweighted to show the real numbers due to small groups but the rest of the results in the table are weighted. Results of weighting table 1 were not significantly different from unweighted. Variables with no significance in the bivariate checks (ie. depression) are not included in Table 1. Findings reveal that menthol cigarette users were younger (p=0.002), more likely to be female (p<0.001) and Black (p<0.001) compared to non-menthol cigarette users. Significantly more menthol cigarette users identified themselves as LGBT (p=0.016) relative to non-menthol cigarette smokers. Compared to current non-menthol cigarette users, significantly fewer menthol cigarette users had generalized anxiety scores over the clinical cut-off (p=0.002).

Correlates of flavored OTP only use were younger age (p <0.001) and female gender (p=0.002). Fewer flavored OTP only users met financial needs with a little money left over (p=0.037) compared to non-flavored OTP only users. Significantly more flavored OTP only users identified themselves as LGBT (p=0.021) relative to non-flavored OTP only users. Findings also indicate that, compared to non-flavored OTP only users, flavored OTP only users reported more current marijuana use (p=0.002) and had higher mean sensation-seeking scores (t=2.44, df=1; p=0.015).

Weighted analysis yielded a prevalence of menthol cigarette use among current cigarette smokers of 40.9%. Use of other product types that are menthol by this group ranged from 0.1% for hookah/shisha to 1.4% for e-cigarettes. Use of flavored OTPs among current cigarette smokers ranged from 0.1% for snus to 2.8% for cigars and hookah/shisha. Among OTP only users, prevalence of use of menthol products ranged from 0.2% for chewing tobacco to 4.1 % for cigars. Use of flavored products among this group ranged from 0.01% for snus to 8.4% for little cigars/cigarillos/bidis and 10.5% for hookah/shisha.

Table 2 presents multivariable logistic regression models for factors associated with menthol cigarette use among current tobacco users. Only those variables that were associated in the bivariate analyses remained in the multivariable models. Results from the fully controlled model (Model 4) indicate that female participants were on average twice as likely to use menthol cigarettes (AOR=2.08; 95% CI 1.35–3.18). Blacks (AOR=5.31; 95% CI 2.56–10.99), those reporting other race (AOR=2.72; 95% CI 1.22–6.07), and Hispanics (AOR=2.46; 95% CI 1.26–4.80) were more likely to be menthol cigarette users compared to non-Hispanic Whites. Identifying oneself as a smoker, social smoker, or occasional smoker (AOR=10.42; 95% CI 5.28–20.53) was associated with significantly increased likelihood of menthol cigarette use relative to those who self-identified as an ex-smoker, having tried smoking, or non-smoker.

Table 3 highlights the factors related to flavored OTP only use. Across all four models, younger respondents were significantly more likely to use flavored other tobacco products only compared to older respondents (AOR=3.41, AOR=3.22, AOR=3.45, AOR=3.50, respectively). In all four models, those who reported a financial situation of “living comfortably” were significantly more likely to use flavored other tobacco products only compared to those who reported a financial situation of ‘meet needs with a little left” (OR=3.68, OR=3.56, OR=3.16, OR=3.07, respectively). Those who identified as a smoker, social smoker, or occasional smoker were significantly less likely to use flavored other tobacco products only relative to those who identified as an ex-smoker, having tried smoking, or non-smoker (Models 2, 3 and 4: OR=0.21, 0.18, 0.18). Respondents with anxiety scores over the clinical cut-off were significantly less likely to use flavored other tobacco products only compared to those who had scores below the cut-off (Models 3 and 4: OR=0.32, OR=.30, respectively). Participants who reported having purchased any tobacco products over the Internet were more likely to use flavored other tobacco products only relative to those who had not made any such purchases (AOR=2.91). However, this difference was of borderline statistical significance (p=0.055). No significant differences in odds of flavored tobacco product only use were observed on gender, race, education level, parent smoking status during childhood, alcohol use, or state level smoking prevalence.

Discussion

This is the first study to explore the factors associated with using menthol cigarettes, non-menthol cigarettes, flavored OTPs and non-flavored OTPs among a nationally representative sample of young adults. Tobacco use prevalence in this sample matches the current national rates (~25%) for young adult tobacco use.[45] Approximately 25% of the Truth Initiative Young Adult Cohort sample (18–34 year olds) reported use of any tobacco product in the past 30 days, and 78% were cigarette only users.

This study employs an existing online panel to recruit a large, nationally representative cohort of young adults, a group typically identified as hard-to-reach. The study sample’s completion rate (46.2%) and cumulative response rate (4.4%) are similar to that of other health studies that have relied on KnowledgePanel.[29–31,46] The internal validity of our results is not compromised by the panel’s cumulative response rate and other work suggests that surveys with a low response rate can still be representative of the sample population,

even though the risk of nonresponse bias is higher.[47,48] Studies assessing nonresponse to panel recruitment in KnowledgePanel have found little indication of nonresponse bias on core demographic and socioeconomic variables[49,50] and previous estimates from this cohort for key outcomes of interest, such as ever and current cigarette use, are consistent with national survey data.[23]

Of the current cigarette users, being of younger age and female gender were also more likely to be flavored OTP only users. In addition, respondents in this group were more likely to use marijuana and score higher on the sensation seeking scale than non-flavored OTP only users. This difference may be because many of the flavored products are newer and experimentation is common in younger adults and those with a propensity for risk taking.

Of the current tobacco users, being female, Black, of Other Non-Hispanic or Hispanic ethnicity remained factors associated with menthol use when controlling for other variables. This finding is well supported by research which indicates that African-American smokers are nearly 11 times more likely to use menthol than White smokers and females are 1.6 times more likely to smoke menthols then men.[51] Additional factors included being Hispanic and identifying as a smoker, social smoker, or occasional smoker. These factors associated with menthol use are consistent with youth patterns and may reflect more specific industry targeting.[2] Being younger increased chances of flavored OTP use while those who self-identified as smokers or as social smokers were the least likely to use flavored OTPs only.

Analyses identified state smoking prevalence as the only policy level variable which contributed to the explanatory power of the model predicting menthol cigarette use. We hypothesized that young adults within states with stronger tobacco control policies may exhibit different use preferences with respect to menthol and flavored products. However, smoking prevalence was found to be associated only with menthol use, not flavored use. Findings may simply reflect that most state tobacco control policies do not yet specifically apply to menthol and/or flavored products. Further research is needed to understand the role of social norms and perceived smoking prevalence as potential influences for promoting a variety of tobacco products.

This study is not without limitations. First, the cross-sectional nature of this study prevents us from attributing causation. Future analyses from this cohort will examine changes in factors associated with tobacco use patterns over time. In addition, smoking status was not biochemically verified and study group status was determined by self-report.

While menthol and flavorings themselves may or may not be addictive,[52] these flavorings may be used to “sweeten the poison,”[53] attract new, young smokers,[9,54] and facilitate progression to regular use.[55] Restricting access to flavored tobacco products may be one intervention to slow the tobacco epidemic, including among vulnerable groups like young women and racial and/or ethnic minorities.

Conclusion

Younger age and self-identified smoking status were significantly associated with flavored OTP only use. Comparisons were made between menthol and non-menthol cigarette users and flavored and non-flavored other tobacco product only users to examine associations with demographic characteristics. The prevalence of menthol cigarette brands was 41% among current cigarette users in the sample. Of the current cigarette users, menthol cigarette users were more likely to be younger, female, Black and LGBT (versus heterosexual) relative to non-menthol users. The association with menthol use and younger age may be a result of the industry adjusting the level of menthol in cigarettes to appeal to younger smokers.[56,57] In addition, menthol users reported more anxiety than non-menthol users.

Acknowledgments

FUNDING

This project has been funded in whole or in part with federal funds from the National Institute on Drug Abuse, National Institutes of Health, and the Food and Drug Administration, Department of Health and Human Services under Contract #HHSN271201100027C. The views and opinions expressed in this manuscript are those of the authors only and do not necessarily represent the views, official policy or position of the US Department of Health and Human Services or any of its affiliated institutions or agencies. Funding for the primary data collection was provided by the Truth Initiative (formerly known as American Legacy Foundation).

The authors would like to acknowledge Kevin Conway (NIH/NIDA), Sarah E. Evans (FDA), Kevin Frissell (Westat) and Nahla Hilmi (NIH/NIDA) for their participation in this project and contributions to the manuscript.

References

1. Hafez N, Ling PM. How Philip Morris built Marlboro into a global brand for young adults: implications for international tobacco control. Tob Control. 2005; 14(4):262–271. [PubMed: 16046690]
2. U. S. Department of Health and Human Services. Preventing tobacco use among youth and young adults: a report of the Surgeon General. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
3. Arnett JJ. Emerging adulthood. A theory of development from the late teens through the twenties. Am Psychol. 2000; 55(5):469–480. [PubMed: 10842426]
4. Ling PM, Glantz SA. Why and how the tobacco industry sells cigarettes to young adults: evidence from industry documents. Am J Public Health. 2002; 92(6):908–916. [PubMed: 12036776]
5. Lee YO, Glantz SA. Menthol: putting the pieces together. Tob Control. 2011; 20(Suppl 2):ii1–7. [PubMed: 21504926]
6. Oliver AJ, Jensen JA, Vogel RI, Anderson AJ, Hatsukami DK. Flavored and nonflavored smokeless tobacco products: rate, pattern of use, and effects. Nicotine Tob Res. 2013; 15(1):88–92. [PubMed: 22529222]
7. World Health Organization. The Scientific basis of tobacco product regulation: Report of a WHO study group. Geneva, Switzerland: World Health Organization; 2007.
8. U.S. Food and Drug Administration. Guidance to Industry and FDA Staff: General Questions and Answers on the Ban of Cigarettes that Contain Certain Characterizing Flavors. 2http://www.fda.gov/TobaccoProducts/ProtectingKidsfromTobacco/FlavoredTobacco/ucm183228.htm
9. Klein SM, Giovino GA, Barker DC, Tworek C, Cummings KM, O'Connor RJ. Use of flavored cigarettes among older adolescent and adult smokers: United States, 2004–2005. Nicotine Tob Res. 2008; 10(7):1209–1214. [PubMed: 18629731]
10. Villanti AC, Richardson A, Vallone DM, Rath JM. Flavored tobacco product use among U.S. young adults. Am J Prev Med. 2013; 44(4):388–391. [PubMed: 23498105]

11. Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. The NSDUH Report: Recent Trends in Menthol Cigarette Use. 2011.
12. Giovino GA, Villanti AC, Mowery PD, et al. Differential trends in cigarette smoking in the USA: is menthol slowing progress? Tob Control. 2015; 24(1):28–37. [PubMed: 23997070]
13. Ambrose BK, Day HR, Rostron B, et al. Flavored Tobacco Product Use Among US Youth Aged 12–17 Years, 2013–2014. JAMA. 2015; 314(17):1871–1873. [PubMed: 26502219]
14. Corey CG, Ambrose BK, Apelberg BJ, King BA. Flavored Tobacco Product Use Among Middle and High School Students--United States, 2014. MMWR Morb Mortal Wkly Rep. 2015; 64(38): 1066–1070. [PubMed: 26421418]
15. King BA, Tynan MA, Dube SR, Arrazola R. Flavored-little-cigar and flavored-cigarette use among U.S. middle and high school students. J Adolesc Health. 2014; 54(1):40–46. [PubMed: 24161587]
16. City of New York. [Accessed April 18, 2016] Flavored Tobacco Product Sale. 2016. http://www1.nyc.gov/nyc-resources/service/2919/flavored-tobacco-product-sale
17. Tobacco Control Legal Consortium. [Accessed April 18, 2016] How Other Countries Regulate Flavored Tobacco Products. 2015. http://publichealthlawcenter.org/sites/default/files/resources/tclc-fs-global-flavored-regs-2015.pdf
18. City of Chicago. [Accessed April 18, 2016] Tobacco Regulations. 2016. http://www.cityofchicago.org/city/en/depts/bacp/supp_info/tobaccoregulations.html
19. Carpenter CM, Wayne GF, Pauly JL, Koh HK, Connolly GN. New cigarette brands with flavors that appeal to youth: tobacco marketing strategies. Health Aff (Millwood). 2005; 24(6):1601–1610. [PubMed: 16284034]
20. Creek, Johnson; Creek, Johnson. [Accessed February 20, 2014] Premium Smoke Juice & Vapor Devices. https://www.johnsoncreeksmokejuice.com/emediahtml
21. Convenience Store Decisions Swisher International. [Accessed February 20, 2015] Convenience Store Decisions. http://www.cstoredecisions.com/tag/swisher-international/
22. Brown JE, Luo W, Isabelle LM, Pankow JF. Candy flavorings in tobacco. N Engl J Med. 2014; 370(23):2250–2252. [PubMed: 24805984]
23. Rath JM, Villanti AC, Abrams DB, Vallone DM. Patterns of tobacco use and dual use in US young adults: the missing link between youth prevention and adult cessation. J Environ Public Health. 2012; 2012:679134. [PubMed: 22666279]
24. GfK Knowledge Networks. [Accessed March 25, 2016] KnowledgePanel Design Summary. 2013. http://www.knowledgenetworks.com/knpanel/docs/knowledgePanel(R)-design-summary-description.pdf
25. Green MP, McCausland KL, Xiao H, Duke JC, Vallone DM, Healton CG. A closer look at smoking among young adults: where tobacco control should focus its attention. Am J Public Health. 2007; 97(8):1427–1433. [PubMed: 17600242]
26. Chang L, Krosnick JA. National surveys via RDD telephone interviewing versus the internet comparing sample representativeness and response quality. Public Opin Q. 2009; 73(4):641–678.
27. Yeager DS, Krosnick JA, Chang L, et al. Comparing the Accuracy of RDD Telephone Surveys and Internet Surveys Conducted with Probability and Non-Probability Samples. Public Opinion Quarterly. 2011; 75(4):709–747.
28. Rhodes DJ, Radecki Breitkopf C, Ziegenfuss JY, Jenkins SM, Vachon CM. Awareness of breast density and its impact on breast cancer detection and risk. J Clin Oncol. 2015; 33(10):1143–1150. [PubMed: 25732156]
29. Grande D, Mitra N, Shah A, Wan F, Asch DA. Public preferences about secondary uses of electronic health information. JAMA internal medicine. 2013; 173(19):1798–1806. [PubMed: 23958803]
30. Kumar S, Quinn SC, Kim KH, Daniel LH, Freimuth VS. The impact of workplace policies and other social factors on self-reported influenza-like illness incidence during the 2009 H1N1 pandemic. Am J Public Health. 2012; 102(1):134–140. [PubMed: 22095353]
31. Fowler FJ Jr, Gerstein BS, Barry MJ. How patient centered are medical decisions?: Results of a national survey. JAMA internal medicine. 2013; 173(13):1215–1221. [PubMed: 23712194]
32. American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 8. 2015.

33. King BA, Dube SR, Tynan MA. Flavored cigar smoking among U.S. adults: findings from the 2009–2010 National Adult Tobacco Survey. Nicotine Tob Res. 2013; 15(2):608–614. [PubMed: 22927687]
34. Fallin A, Goodin AJ, King BA. Menthol cigarette smoking among lesbian, gay, bisexual, and transgender adults. Am J Prev Med. 2015; 48(1):93–97. [PubMed: 25245795]
35. VanKim NA, Padilla JL, Lee JG, Goldstein AO. Adding sexual orientation questions to statewide public health surveillance: New Mexico's experience. Am J Public Health. 2010; 100(12):2392–2396. [PubMed: 20966370]
36. Stephenson MT, Velez LF, Chalela P, Ramirez A, Hoyle RH. The reliability and validity of the Brief Sensation Seeking Scale (BSSS-8) with young adult Latino workers: implications for tobacco and alcohol disparity research. Addiction. 2007; 102(Suppl 2):79–91. [PubMed: 17850617]
37. Wild B, Eckl A, Herzog W, et al. Assessing generalized anxiety disorder in elderly people using the GAD-7 and GAD-2 scales: results of a validation study. Am J Geriatr Psychiatry. 2014; 22(10): 1029–1038. [PubMed: 23768681]
38. Kroenke K, Spitzer RL, Williams JB, Monahan PO, Lowe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. Ann Intern Med. 2007; 146(5):317–325. [PubMed: 17339617]
39. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care. 2003; 41(11):1284–1292. [PubMed: 14583691]
40. The Tax Burden on Tobacco. Vol. 46. Arlington, VA: Orzechowski and Walker; 2011.
41. American Nonsmokers' Rights F. Percent of U.S. State Populations Covered by 100% Smokefree Air Laws. 2013.
42. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2009.
43. Centers for Disease Control and Prevention. State-Specific Prevalence of Cigarette Smoking and Smokeless Tobacco Use Among Adults—United States, 2009. MMWR Morb Mortal Wkly Rep. 2010; 59(4):1400–1406. [PubMed: 21048561]
44. Stata Statistical Software: Release 13.1 [computer program]. College Station, TX: StataCorp, LLC; 2013.
45. Agaku IT, King BA, Husten CG, et al. Tobacco product use among adults--United States, 2012–2013. MMWR Morb Mortal Wkly Rep. 2014; 63(25):542–547. [PubMed: 24964880]
46. Kelly B, Squiers L, Bann C, Stine A, Hansen H, Lynch M. Perceptions and plans for prevention of Ebola: results from a national survey. BMC Public Health. 2015; 15(1):1136. [PubMed: 26572610]
47. Brick JM. The Future of Survey Sampling. Public Opinion Quarterly. 2011; 75(5):872–888.
48. Halbesleben JR, Whitman MV. Evaluating survey quality in health services research: a decision framework for assessing nonresponse bias. Health Serv Res. 2013; 48(3):913–930. [PubMed: 23046097]
49. Heeren T, Edwards EM, Dennis JM, Rodkin S, Hingson RW, Rosenbloom DL. A comparison of results from an alcohol survey of a prerecruited Internet panel and the National Epidemiologic Survey on Alcohol and Related Conditions. Alcohol Clin Exp Res. 2008; 32(2):222–229. [PubMed: 18162076]
50. Garrett, J.; Dennis, JM.; DiSogra, CA. Non-response bias: Recent findings from address-based panel recruitment. Annual Conference of the American Association for Public Opinion Research; 2010; Chicago, IL.
51. Lawrence D, Rose A, Fagan P, Moolchan ET, Gibson JT, Backinger CL. National patterns and correlates of mentholated cigarette use in the United States. Addiction. 2010; 105(Suppl 1):13–31. [PubMed: 21059133]
52. Ahijevych K, Garrett BE. Menthol pharmacology and its potential impact on cigarette smoking behavior. Nicotine Tob Res. 2004; 6(Suppl 1):S17–28. [PubMed: 14982706]
53. Giovino G, Sidney S, Gfroerer J, et al. Epidemiology of menthol cigarette use. Nicotine Tob Res. 2004; 6(Suppl 1):S67– S81. [PubMed: 14982710]

54. Kreslake JM, Wayne GF, Alpert HR, Koh HK, Connolly GN. Tobacco industry control of menthol in cigarettes and targeting of adolescents and young adults. Am J Public Health. 2008; 98(9): 1685–1692. [PubMed: 18633084]

55. Ahijevych K, Garrett BE. The role of menthol in cigarettes as a reinforcer of smoking behavior. Nicotine Tob Res. 2010; 12(suppl 2):S110–S116. [PubMed: 21177367]

56. Kreslake JM, Wayne GF, Alpert HR, Koh HK, Connolly GN. Tobacco industry control of menthol in cigarettes and targeting of adolescents and young adults. Am J Public Health. 2008; 98(9): 1685–1692. [PubMed: 18633084]

57. Klausner K. Menthol cigarettes and smoking initiation: a tobacco industry perspective. Tob Control. 2011; 20(Suppl 2):ii12–19. [PubMed: 21504927]

Highlights

- Being female Black/other race or Hispanic is correlated with menthol cigarette use
- Younger age (18–24 vs 25–34 years) is a predictor of flavored tobacco product use
- Restricting access to flavored tobacco products could limit use in young adults

Table 1

Summary of demographics for menthol and non-menthol cigarette users and non-flavored and flavored other tobacco product only users (total sample *n*=4,239; subgroup denominator *n*=1,037 current tobacco users with valid data on menthol and/or flavored items) [WAVE III]

Variable		Full Sample (*n*=4,239)	Menthol Cigarette Users (*n*=311)	Non-menthol Cigarette Users (*n*=426)	p^*	Flavored Other (non-cig) Tobacco Only Users (*n*=114)	Non-flavored Other (non-cig) Tobacco Only Users (*n*=186)	p^*
			% or *mean*	% or *mean*		% or *mean*	% or *mean*	
Overall			30.0	41.1		11.0	17.9	
Age (%)	18–24	60.1	45.7	34.5	**0.002**	64.9	40.9	**<.001**
	25–34	39.9	54.3	65.5		35.1	59.1	
Gender (%)	Male	41.0	40.2	54.0	**<.001**	51.8	69.4	**0.002**
	Female	59.0	59.8	46.0		48.3	30.7	
Race/ethnicity (%)	White non-Hispanic	61.6	56.0	73.5	**<.001**	56.1	63.4	0.209
	Black non-Hispanic	9.4	15.8	2.4	**<.001**	10.5	8.6	0.578
	Other, non-Hispanic	8.0	8.4	7.5	0.673	9.7	5.4	0.159
	Hispanic	21.0	19.9	16.7	0.254	23.7	22.6	0.826
Education (%)	Less than high school	7.5	9.4	8.7	0.741	7.9	8.6	0.830
	High school	22.8	30.9	28.9	0.558	23.7	23.7	0.996
	Some college or more	69.7	60.5	61.7	0.723	68.4	67.7	0.903
Self-identified financial situation (%)	Don't/just meet basic expenses	36.5	52.4	46.7	0.112	43.0	33.9	0.113
	Meet needs with a little left	39.6	35.7	37.0	0.746	32.5	44.6	**0.037**
	Live comfortably	24.0	11.9	16.3	0.100	24.6	21.5	0.539
Income to poverty <1.00 (%)	Less than 1	20.8	32.8	26.5	0.064	19.3	18.8	0.918
	1+	79.2	67.2	73.5		80.7	81.2	
Parent(s) smoked during childhood (%)	Neither of them	54.9	33.0	37.0	0.290	51.7	53.2	0.804
	One or both of them	45.1	67.0	63.2		48.3	46.8	
Sexual orientation (%)	Heterosexual/straight	93.5	85.8	91.5	**0.016**	89.3	96.1	**0.021**
	LGBT	6.5	14.2	8.6		10.7	3.9	
Sensation seeking (mean, SD)		(23.2,6.0)	(26.1,6.2)	(25.4,5.8)	0.121	(26.4,5.2)	(24.7,6.0)	**0.015**

Variable		Full Sample (*n*=4,239)	Menthol Cigarette Users (*n*=311)	Non-menthol Cigarette Users (*n*=426)	*p**	Flavored Other (non-cig) Tobacco Only Users (*n*=114)	Non-flavored Other (non-cig) Tobacco Only Users (*n*=186)	*p**
			% or mean	*% or mean*		*% or mean*	*% or mean*	
Anxiety (PHQ-2—GAD) (%)	Under the cut-off	87.3	73.9	83.2	**0.002**	82.1	85.9	0.391
	Over the cut-off	12.7	26.1	16.8		17.9	14.1	
Other substance use (%)	No current use	37.2	19.0	20.2	0.686	10.5	16.1	0.175
	Any current use	62.8	81.0	79.8		89.5	83.9	
Alcohol use (%)	No current alcohol use	38.6	21.9	23.9	0.523	14.0	18.8	0.284
	Current alcohol use	61.4	78.1	76.1		86.0	81.2	
Marijuana use (%)	No current marijuana use	90.1	75.0	77.1	0.505	70.8	85.3	**0.002**
	Current marijuana use	9.9	25.0	22.9		29.2	14.7	
Other drug use (%)	No current other drug use	98.2	94.5	96.7	0.144	94.7	95.1	0.873
	Current other drug use	1.8	5.5	3.3		5.3	4.9	
Buy tobacco products on the Internet (%)	Have not purchased any		92.0	91.1	0.672	86.6	86.6	0.944
	Have purchased		8.0	8.9		13.2	13.4	
Self-identified smoking status (%)	Smoker/social smoker/ occasional smoker	18.7	87.8	82.4	**0.044**	22.3	28.1	0.270
	Ex-smoker/tried smoking/ non-smoker	81.3	17.7	12.2		77.7	71.9	

[b]Sample sizes for the menthol cigarette users group ranged from 307 to 311 for the current variable list. Sample sizes ranged from 422–426 for the non-menthol cigarette users group, from 111–114 for the flavored other tobacco product only users and from 184–186 for the non-flavored other tobacco product only users.

*Comparisons are between menthol and non-menthol cigarette users and between flavored and non-flavored other tobacco product users, respectively.

Note: There are 13 cases missing on menthol use (750 total unwted current cigarette users, 737 of whom have valid data on menthol use). 586 (76.1%) of the current cigarette users reported using cigarettes only. 22 (24 wted) of the current cigarette users reported flavored cigarette use, 15 of whom used cigarettes only. 11 cases reported dual use of menthol and flavored cigarettes and 4 cases reported using flavored cigarettes only.

Table 2

Multivariable models to identify factors associated with menthol cigarette use among current tobacco users—WEIGHTED.

	Current Tobacco Users (*n*=1,104)											
	Model 1			Model 2			Model 3			Model 4		
Variable	**OR**	**95% CI**	***p***	**OR**	**95% CI**	***p***	**OR**	**95% CI**	***p***	**OR**	**95% CI**	***p***
Age												
18–24	0.84	(0.54–1.32)	0.452	0.96	(0.61–1.53)	0.875	0.77	(0.46–1.27)	0.305	0.78	(0.47–1.29)	0.335
25–34	ref			ref			ref			ref		
Gender												
Male	ref			ref			ref			ref		
Female	1.99	(1.34–2.97)	**0.001**	2.22	(1.47–3.34)	**0.001**	2.07	(1.35–3.17)	**0.001**	2.08	(1.35–3.18)	**0.001**
Race/ethnicity												
White, non-Hispanic	ref			ref			ref			ref		
Black, non-Hispanic	3.53	(1.72–7.24)	**0.001**	4.90	(2.35–10.20)	**0.001**	5.37	(2.59–11.11)	**0.001**	5.31	(2.56–10.99)	**0.001**
Other, non-Hispanic	1.72	(0.76–3.91)	0.197	2.39	(1.07–5.32)	**0.033**	2.44	(1.12–5.32)	**0.025**	2.72	(1.22–6.07)	**0.015**
Hispanic	1.95	(1.08–3.51)	**0.027**	2.29	(1.26–4.18)	**0.007**	2.13	(1.12–4.04)	**0.020**	2.46	(1.26–4.80)	**0.008**
Education												
Less than high school	1.35	(0.62–2.91)	0.448	1.13	(0.51–2.50)	0.762	1.40	(0.62–3.17)	0.417	1.33	(0.60–2.92)	0.484
High school	ref			ref			ref			ref		
Some college	1.27	(0.77–2.09)	0.343	1.40	(0.84–2.34)	0.200	1.26	(0.75–2.14)	0.379	1.29	(0.77–2.18)	0.338
Income to FPL												
< 1.0	1.45	(0.89–2.37)	0.140	1.28	(0.76–2.16)	0.346	1.21	(0.72–2.05)	0.469	1.21	(0.72–2.04)	0.464
≥ 1.0	ref			ref			ref			ref		
Self-identified smoking status												
Smoker/social/occasional smoker				8.79	(4.66–16.58)	**0.001**	10.17	(5.19–19.94)	**0.001**	10.42	(5.28–20.53)	**0.001**
Ex-smoker/tried smoking/ non-smoker	ref			ref			ref			ref		

Note: Parent(s) smoked during childhood, sexual identity, PHQ-GAD, and sensation seeking were included in the models but were excluded from the table because they were not associated with menthol cigarette use among current tobacco users.

Table 3

Multivariable models to identify factors associated with flavored other (non-cigarette) tobacco-product only use among current tobacco users—WEIGHTED.

	Current Tobacco Users (*n*=1,104)											
	Model 1			Model 2			Model 3			Model 4		
Variable	**OR**	**95% CI**	***p***	**OR**	**95% CI**	***p***	**OR**	**95% CI**	***p***	**OR**	**95% CI**	***p***
Age												
18–24	3.41	(1.82–6.40)	**0.001**	3.22	(1.58–6.56)	**0.001**	3.45	(1.67–7.12)	**0.001**	3.50	(1.68–7.30)	**0.001**
25–34	ref			ref			ref			ref		
Gender												
Male	ref			ref			ref			ref		
Female	1.26	(0.68–2.35)	0.458	1.27	(0.66–2.44)	0.474	1.50	(0.79–2.89)	0.213	1.52	(0.80–2.92)	0.204
Race/ethnicity												
White, non-Hispanic	ref			ref			ref			ref		
Black, non-Hispanic	2.01	(0.76–5.36)	0.162	2.34	(0.75–7.29)	0.143	2.39	(0.72–8.00)	0.157	2.58	(0.76–8.68)	0.127
Other, non-Hispanic	1.24	(0.39–3.92)	0.715	1.02	(0.25–4.26)	0.975	1.30	(0.34–5.00)	0.703	1.21	(0.31–4.81)	0.785
Hispanic	0.90	(0.41–1.95)	0.787	0.99	(0.45–2.21)	0.986	1.19	(0.53–2.68)	0.671	1.07	(0.45–2.57)	0.872
Education												
Less than high school	0.33	(0.11–0.96)	**0.043**	0.41	(0.12–1.40)	0.155	0.44	(0.13–1.45)	0.175	0.44	(0.13–1.46)	0.181
High school	ref			ref			ref			ref		
Some college	0.90	(0.45–1.81)	0.765	0.89	(0.40–1.96)	0.768	0.84	(0.39–1.77)	0.641	0.83	(0.39–1.76)	0.620
Self-perceived financial situation												
Don’t/just meet basic needs	0.98	(0.48–2.00)	0.964	1.09	(0.49–2.46)	0.829	1.09	(0.45–2.64)	0.848	1.05	(0.44–2.55)	0.906
Meet needs with a little left	ref			ref			ref			ref		
Live comfortably	3.68	(1.69–8.03)	**0.001**	3.56	(1.48–8.57)	**0.005**	3.15	(1.35–7.37)	**0.008**	3.07	(1.34–7.05)	**0.008**
Self-identified smoking status												
Smoker/social/occasional smoker				0.21	(0.10–0.43)	**0.001**	0.18	(0.09–0.37)	**0.001**	0.18	(0.09–0.36)	**0.001**
Ex-smoker/tried smoking/ non-smoker				ref			ref			ref		
Anxiety (PHQ—GAD)												
Under the cut-off							ref			ref		

Variable	Current Tobacco Users (*n*=1,104)											
	Model 1			Model 2			Model 3			Model 4		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Over the cut-off							0.32	(0.10–0.98)	**0.047**	0.30	(0.09–0.94)	**0.040**

Note: Parent(s) smoked during childhood, alcohol use, buy tobacco products on the Internet and state-level smoking prevalence were included in the models but were excluded from the table because they were not associated with flavored other (non-cigarette) tobacco-product only us among current tobacco users.