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Original Investigation

Menthol Cigarette Use Among Adults Who Smoke Cigarettes, 2008–2020: Rapid Growth and Widening Inequities in the United States

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Abstract

Introduction: In April 2021, the U.S. Food and Drug Administration announced its intention to issue a product standard banning menthol as a characterizing flavor in cigarettes. Given the potential relevance of national estimates of menthol use to pending legislation, this study estimated the prevalence of menthol use among U.S. adults who smoke cigarettes in 2020 and investigated changes in menthol use from 2008 to 2019 by sociodemographics, mental health, and substance use.

Aims and Methods: Nationally representative annual, cross-sectional data from the National Survey on Drug Use and Health, which included participants ages 18 years and older residing in the United States from 2008 to 2019 and the 2020. Data were analyzed using logistic and linear regression models to estimate trends in menthol use among adults who smoke cigarettes by sociodemographic, mental health and substance use variables (total analytic sample 2008–2019 n = 128 327).

Results: In 2020, 43.4% of adults who smoked cigarettes in the past month used menthol. Menthol use was most common among black adults (80%) and over 50% of those Hispanic, female, young (ages 18–34 years), lesbian/gay, with serious psychological distress, and with cigar use used menthol. Menthol use increased among adults who used cigarettes from 2008 to 2019, overall, and grew more rapidly among adults ages 26–34 years, Hispanic, light cigarette use (1–5 per day), and those who smoked cigars.

Conclusions: Menthol use has increased among U.S. adults who smoke cigarettes over the past decade. Enacting menthol bans could have a widespread public health impact, especially among younger and minoritized groups.

Implications: Menthol cigarette use increased among individuals who smoke cigarettes from 2008 to 2019 in the United States. In 2020, over 40% of smokers used menthol, and menthol use was considerably higher among adult smokers from racial/ethnic minoritized groups, who were younger and who reported mental health problems. The U.S. Food and Drug Administration seeks to ban menthol as a characterizing flavor in cigarettes; our results suggest that such a ban is likely to have a wide-ranging impact on public health.

Introduction

Tobacco use remains the leading cause of preventable disease and premature mortality in the United States.[1] Although cigarette use has declined dramatically in the past two decades,[1,2] the decline is much slower among certain tobacco use disparity groups (e.g. those with lower socioeconomic status, mental health problems, substance use, and who identify as a sex or gender minority). The prevalence of cigarette smoking among these priority groups can be more than twice as high as the prevalence in the general U.S. population prevalence (e.g. 19.2%–35.3% vs. 14.0%)[2,3] indicating that these groups bear a disproportionate burden of tobacco-related disease. It is critical to identify modifiable barriers to the cessation that may be contributing to these disparities so that tobacco control is successful for all.

Menthol cigarettes are associated with increased cigarette dependence and greater difficulty quitting cigarettes among those with current cigarette use.[4–6] As such, if the proportion of cigarette smokers who prefer menthol is increasing, it is conceivable that slower declines could in part be driven by increased menthol use; and in fact, cigarette sales increased in 2020 for the first time in over two decades.[7] The majority of the decline in cigarette use is attributed to declines in nonmenthol cigarettes, which decreased by approximately 53% from 2000 to 2018.[8] In contrast, menthol consumption declined by only 26% during the same period and increased

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in cigarette market share by nearly 10 percentagepoints.[8] If menthol use has increased disproportionately among existing tobacco use disparity groups,[2,3] it is conceivable that an increasing menthol use among those who smoke could be contributing to the disproportionately elevated cigarette smoking prevalence and a slower decline in cigarette smoking specifically seen among these disparity groups. In fact, our past research suggests that the prevalence of menthol use among people who use cigarettes is greater for some tobacco use disparity groups; U.S. data from 2018 suggest a higher prevalence of menthol use among those with younger ages (47.82%–49.70% for those who are 12–34 years old vs. 29.21% for those who are 65 and older), for non-Hispanic black versus non-Hispanic white individuals (84.62% vs. 29.35%), for lesbian, gay, and bisexual versus heterosexual individuals (51.39%–45.93% vs. 38.96%), those with lower versus higher SES (42.33%–46.78% vs. 35.78%) and those with versus without serious psychological distress (45.29% vs. 39.03%).[9]

Given the appeal of menthol, several countries, including Canada and the United Kingdom, have banned menthol as a characterizing flavor. Action has been lacking in the United States. In April 2021, the U.S. Food and Drug Administration Center for Tobacco Products (FDA-CTP) announced its intention to issue a product standard that would ban menthol as a characterizing flavor in cigarettes at the federal level. However, given the regulatory process required to issue a product standard and the potential for tobacco industry litigation, menthol cigarettes will likely remain on the market for a considerable amount of time.[10] Menthol cigarettes are responsible for millions of life years lost (from 1980 to 2018: 3 million life years lost and 378 000 premature deaths),[9] especially among black individuals.[11] Therefore, updated information on menthol use among cigarette smokers, the direction and speed of trends in menthol use among cigarette smokers, and subgroup differences in use and trends in use over time, are needed to inform FDA's regulatory efforts related to menthol and to develop additional policies and strategies for prevention and intervention specifically focused on reducing inequities.

The current study aimed to address these questions. First, the study estimated menthol use among cigarette smokers in the United States in 2020 overall and by sociodemographic, mental health, substance use, and smoking/tobacco use factors. Second, the study examined whether the proportion of menthol use among current smokers has changed in the United States from 2008 to 2019. Third, the study estimated the degree to which menthol use among smokers changed in the United States over the past decade differentially by sociodemographics (gender, age, education, income, race/ethnicity, and sexual orientation), mental health (serious psychological distress and depression) and substance use (alcohol use and cannabis use) characteristics, and smoking/tobacco use levels.

Methods

The National Survey on Drug Use and Health (NSDUH) is an annual cross-sectional survey based on a multistage probability sample of the U.S. noninstitutionalized population. The analytic samples for the current study included individuals with past-month cigarette smoking who did not have missing data for past-month menthol use. We used two analytic samples for the current study. When estimating the current prevalence of menthol use among individuals with past-month cigarette smoking, we used 2020 NSDUH data (n = 3953). When estimating trends over time we used data from 2008 to 2019 NSDUH (N = 128 327). We did not include the 2020 data in our trend analyses, because of the Coronavirus Disease 2019 pandemic, methods used in 2020 differed from earlier iterations of NSDUH, making the 2020 data statistically incomparable with prior estimates.

Sampling weights for the NSDUH were computed to control for unit-level and individual-level nonresponse and adjusted to ensure consistency with population estimates obtained from the U.S. Census Bureau.[12] Additional information describing the complex sampling weight methodology for the NSDUH can be found elsewhere.[12] Analysis of de-identified data from the survey is exempt from federal regulations for the protection of human research participants.

Measures

Menthol Use

All past-month cigarette smokers were asked, "Were the cigarettes you smoked during the past 30 days menthol?" (yes/no). Menthol use was defined as past-month use of menthol cigarettes among those with past-month cigarette smoking (vs. past-month use of nonmenthol cigarettes among those with past-month cigarette smoking). Those who responded "don't know" or did not answer the question were coded as missing.

Sociodemographic Characteristics

Gender (male, female), age (18–25, 26–34, 35–49, 50–64, 65, and older years), education (less than high school, high school graduate, some college, college, or greater), annual household income (less than $20 000, $20 000–$49 999, $50 000–$74 999, $75 000, or more), race/ethnicity (non-Hispanic (NH) white, NH black, NH Other, and Hispanic) and sexual orientation identity (heterosexual, gay/lesbian, and bisexual) were measured. As a note, sexual orientation identity data for trend analyses are only presented from 2015 to 2019 as 2015 is the year that the NSDUH began to collect this detailed information.

Serious Psychological Distress

Past-month SPD was measured using the Kessler Psychological Distress Scale (K6),[13,14] a measure of nonspecific psychological distress intended to be used in large, national health surveys to identify individuals with a high likelihood of having a diagnosable mental illness.[13,15] Respondents were asked the following six items: "During the past 30 days, how often did you feel…. (1) so sad that nothing could cheer you up?, (2) nervous?, (3) restless or fidgety?, (4) hopeless?, (5) that everything was an effort?, and (6) worthless? Answer choices included: All of the time (4), most of the time (3), some of the time (2), a little of the time (1), and none of the time (0). Responses were summed (0–24) and those with a score of higher than 13 were categorized as having past-month SPD and those with a score of 13 or lower were categorized as not having past-month SPD, similar to past research.[16–19]

Depression

Depression was assessed using the DSM-IV criteria for a major depressive episode (MDE)[20] and adapted from the

depression section of the National Comorbidity Survey-Replication.[21] Respondents were classified as having a lifetime MDE based on reporting five or more of nine MDE symptoms during the same 2-week period in their lifetime, with at least one symptom being a depressed mood or loss of interest or pleasure in daily activities. Respondents with a lifetime MDE were then classified as having a past-year MDE if they reported feeling depressed or loss of interest or pleasure in daily activities for ≥2 weeks during the past 12 months, while also having some of the other symptoms for lifetime MDE. For the analyses, respondents were categorized as having past-year MDE (yes/no).

Substance Use

Past 30-day cannabis and alcohol use were assessed, and participants were classified as having past-month cannabis use (yes/no) and as having past-month alcohol use (yes/no).

Frequency of Smoking

Daily smokers were defined as past-month cigarette smokers who reported smoking on 30 of the past 30 days; nondaily smokers were defined as past-month cigarette smokers who reported smoking on 1–29 of the past 30 days.

Cigarettes Per Day

Past-month cigarette smokers were asked, "On the (number of days) you smoked cigarettes during the past 30 days, how many cigarettes did you smoke per day, on average?" For the analyses, responses were categorized as: 1–5 cigarettes per day (CPD), 6–15 CPD, and 16 or more CPD similar to other research.[22,23]

Cigarette Dependence

Cigarette dependence was assessed using the time to first cigarette item from the Fagerström Test for Cigarette Dependence [24] originally named the Fagerström Test for Nicotine Dependence.[25] The time to the first cigarette assesses how long an individual goes before having the first cigarette of the day[25] and has been used in other research as a proxy for cigarette dependence.[22,23,26] Past-month cigarette smokers were asked, "On the days that you smoke, how soon after you wake up do you have your first cigarette?" Respondents who reported smoking within 30 minutes after waking were considered to be cigarette dependent while respondents who reported smoking their first cigarette longer than 30 minutes after waking were considered to be not cigarette dependent, similar to other research.[22,23,27,28]

Cigar Use

Past-30-day cigar use was assessed, and participants were classified as having past-month cigar use (yes/no).

Statistical Analysis

All analyses were conducted using SVY procedures in Stata version 16.1 to allow for weighted estimates. All analyses accounted for the complex NSDUH sampling design, applying sampling weights provided with the public-use data, and using Taylor Linearization to estimate standard errors. The prevalence and 95% confidence intervals of menthol cigarette use among past-month cigarette smokers in the years 2008–2020 were estimated overall and stratified by sociodemographic, mental health, substance use, and smoking/tobacco use characteristics. To assess the differences in menthol cigarette use by these characteristics in 2020, the most recent year data were available, and crude weighted logistic regressions were used (see Table 1). Next, trends in menthol cigarette use among past-month cigarette smokers over time (2008–2019) were examined overall and stratified by sociodemographic (see Supplementary Table 2), mental health, substance use, and smoking/tobacco characteristics (see Supplementary Tables 3 and 4). First, weighted crude logistic regressions with continuous years as the predictor were used to test the time trends in menthol cigarette use. Next, an interaction term between the year and each characteristic was added to each model to examine whether trends in menthol cigarette use differed between strata (e.g. males vs. females; 18–25 vs. 26-34 vs. 35–49 vs. 50–64 vs. 65+ years old). For variables with 3+ categories, a significant interaction was further analyzed with contrasts (e.g. to compare reference category age 18–25 vs. 26–34, 18–25 vs. 35–49 years old, etc.). Missing data were handled with list-wise deletion.

Results

Menthol Use Among Adults With Past-Month Smoking, 2020

Overall

Overall, 43.4% of adult cigarette smokers used menthol cigarettes in 2020 (see Table 1).

Sociodemographic Characteristics

The demographic subgroup of cigarette smokers with the greatest use of menthol in 2020 was NH black adults, with more than 4 out of 5 (80.9%) individuals in this group reporting menthol cigarette use; in addition, over half of Hispanic smokers reported menthol cigarette use (51.26%; see Table 1). Other subgroups with the highest menthol cigarette use were young adults ages 18–25 years (52.86%), adults ages 26–34 years (50.42%), and individuals who identified as lesbian/gay (54.47%). Comparing menthol use within demographic subgroups, menthol use was more common among females, compared to males, and NH black and Hispanic adults compared to NH white adults. Use of menthol cigarettes was less common among: Adults ages 35 years and older compared to those ages 18–25 years; adults who had completed college compared to adults who had not completed high school; and adults with incomes of $75 000 a year or more compared to adults with incomes of less than $20 000 a year.

Mental Health

Menthol use was reported by 50.61% of adult cigarette smokers with SPD and 43.92% of adult cigarette smokers with major depression (see Table 1). There was no difference in menthol use among adults with and without SPD or major depression.

Substance Use

Menthol use was reported by 48.30% of adult cigarette smokers who reported past-month alcohol use and 43.34% of adult cigarette smokers who reported past-month cannabis use (see Table 1). Menthol use was more common among adults who reported past-month alcohol use, relative among those who did not. There was no difference in menthol

Table 1. Menthol Use Among Past-30-Day National Survey on Drug Use and Health Cigarette Smokers, Adults Ages ≥18 Years, National Survey on Drug Use and Health 2020 (*n* = 3953)

	% (95% CI)	OR (95% CI)	*P*-value
Overall	43.37 (40.26, 46.52)		
Gender			.0002
Male	37.89 (34.39, 41.51)	Reference	
Female	49.58 (44.87, 54.29)	1.61 (1.27, 2.03)	
Age, y			.0039
18–25	52.86 (48.71, 56.96)	Reference	
26–34	50.42 (44.87, 55.96)	0.91 (0.68, 1.22)	
35–49	40.48 (36.34, 44.76)	0.61 (0.48, 0.76)	
50–64	37.80 (31.08, 45.03)	0.54 (0.39, 0.76)	
≥65	42.24 (33.44, 51.56)	0.65 (0.44, 0.97)	
Education			.0179
Less than high school	43.22 (35.6, 51.17)	Reference	
High school grad	45.08 (40.44, 49.82)	1.08 (0.76, 1.53)	
Some college	46.03 (41.21, 50.91)	1.12 (0.80, 1.57)	
College or more	31.61 (25.50, 38.43)	0.61 (0.40, 0.91)	
Annual household income			.0120
Less than $20 000	49.12 43.77, 54.50)	Reference	
$20 000-$49 999	42.74 (37.88, 47.74)	0.77 (0.59, 1.02)	
$50 000-$74 999	49.24 (40.92, 57.61)	1.00 (0.69, 1.46)	
$75 000 or more	34.03 (28.91, 39.55)	0.53 (0.37, 0.77)	
Race/ethnicity			<.0001
NH white	33.75 (30.76, 36.87)	Reference	
NH black	80.92 (73.46, 86.66)	8.32 (5.15, 13.46)	
NH Other	41.42 (32.27, 51.21)	1.39 (0.94, 2.04)	
Hispanic	51.26 (41.08, 61.34)	2.06 (1.40, 3.05)	
Sexual identity			.0965
Heterosexual	41.97 (38.6, 45.41)	Reference	
Lesbian/gay	54.47 (39.95, 68.27)	1.65 (0.88, 3.10)	
Bisexual	48.83 (40.21, 57.53)	1.32 (0.92, 1.89)	
Past-month SPD			.0574
SPD	50.61 (42.57, 58.63)	1.40 (0.99, 1.97)	
No SPD	42.33 (39.02, 45.71)	Reference	
Past-year MDE			.6800
Yes	43.92 (37.12, 50.95)	1.06 (0.79, 1.42)	
No	42.46 (39.19, 45.79)	Reference	
Smoking frequency			.0044
Daily smoker	40.2 (36.09, 44.47)	0.72 (0.57, 0.90)	
Nondaily smoker (1–29 days/month)	48.44 (44.43, 52.47)	Reference	
Cigarettes per day			.0003
1–5	50.21 (45.28, 55.14)	Reference	
6–15	40.86 (36.34, 45.54)	0.69 (0.52, 0.90)	
≥16	34.43 (28.32, 41.09)	0.52 (0.37, 0.74)	
Cigarette dependence (Time to first cigarette)			.8700
<30 min	43.53 (39.19, 47.97)	1.02 (0.77, 1.37)	
>30 min	42.95 (37.88, 48.16)	Reference	
Past-30-day cannabis use			.9900
Yes	43.34 (38.80, 48.0)	1.00 (0.77, 1.29)	
No	43.38 (39.36, 47.48)	Reference	
Past-30-day alcohol use			<.0001
Yes	48.30 (44.8, 51.82)	1.63 (1.35, 1.97)	
No	36.43 (32.44, 40.62)	Reference	
Past-30-day cigar use			.0345
Yes	53.94 (43.51, 64.03)	1.62 (1.03, 2.54)	
No	41.94 (38.61, 45.34)	Reference	

NH = non-Hispanic; SPD = serious psychological distress; MDE = major depressive episode; OR = odds ratio; CI = confidence interval; NSDUH = National Survey on Drug Use and Health.

cigarette use among adult smokers with and without past-month cannabis use.

Smoking/Tobacco Use Characteristics

Menthol use was more common among adults who use cigarettes non-daily, compared with daily, and among those who smoked 1–5 CPD, compared to those who smoked 16 or more CPD. There was no difference in menthol use among those with and without cigarette dependence. Adult cigarette smokers who used cigars in the past month were more likely to report menthol use than those who did not use cigars (see Table 1).

Trends in Menthol Use Among Adults With Cigarette Use From 2008 to 2019

Overall

There was a significant linear increase in menthol cigarette use among adults smoking cigarettes from 33.76% in 2008 to 40.58% in 2019 (OR = 1.03 [95% CI {1.02, 1.03}]; see Supplementary Table 2).

Sociodemographic Characteristics

Menthol use significantly increased among all gender, education, and income subgroups from 2008 to 2019, and there was no significant difference in the speed of trends amongst those subgroups (see Supplementary Table 2). Likewise, menthol use increased among younger adults with past-month smoking (18–49 years old), while there was no significant change in menthol use among adults 50 and older. Relative to 18–25-year-olds, the increase was more rapid among 26–34-year-olds and similar among 35–49 years old. Menthol use increased among NH white, Hispanic, and NH Other adults but did not significantly change among NH black adults. The increase in menthol use was more rapid among Hispanic relative to NH white adults.

Mental Health

Menthol use increased significantly among adults with and without SPD or MDE from 2008 to 2019 with no difference in speed of trends among these subgroups (see Supplementary Table 3).

Substance Use

Menthol use increased from 2008 to 2019 both among those who did and did not use cannabis and alcohol, with no difference in speed of change between those with and without cannabis and alcohol use in the past month (see Supplementary Table 3).

Smoking/Tobacco Use Characteristics

Menthol use significantly increased from 2008 to 2019 among all smoking and tobacco characteristic subgroups. Specifically, menthol use increased among those with daily and nondaily smoking, those at all CPD levels, those with and without cigarette dependence, and those who did and did not use cigars in the past month. The increase in menthol use was faster among those without cigarette dependence (see Supplementary Table 3).

Discussion

Menthol use increased substantially among current cigarette smokers over the past 10 years. The overall increase in the proportion of smokers who use menthol is consistent with the increase in menthol market share,[8,29] and concurrent with an overall decline in cigarette use in the United States.[8,29,30] Our study extends past research by demonstrating that while the increase in menthol use among smokers over the past decade was evident across most demographic, mental health, substance use, and cigarette/tobacco characteristic subgroups; this increase was significantly more rapid among younger, minoritized race/ethnicity group and adults with mental health problems. Independent of trends, data from 2020 show persistent and unmitigated inequities in menthol use among tobacco use disparity group members.

The current study showed that in 2020, the most recent year of available data, menthol use was common among approximately two out of five cigarette smokers overall. Over 80% of black smokers preferred menthol in 2020, which is stable relative to prior reports.[10,31] That approximately 50% of smokers who were Hispanic, female, ages 18–25 and26–34 years, lesbian/gay and adults with mental health problems, smoked nondaily, and used fewer CPD used menthol in 2020 is higher than prior reports and reflects expanding use across all segments of the population of adults who smoke cigarettes.[32] Extending to the best of our knowledge from prior studies of menthol use in the general United States, our findings reflect the persistence of some existing inequities, as well as emerging and escalating disparities.

Menthol use increased among all adults who smoke cigarettes under the age of 50 years over the study period, yet use increased more rapidly among smokers ages 26–34 years than among those ages18–25 years, from 33% in 2008 to 51% in 2019. Mattingly et al.[30] found that while menthol use was highest among 18–24-year-olds in 2005, 10 years later it was highest among 25–34-year-olds. In the current study, the three younger age groups (18–24, 25–34, and 35–49-year-olds) exhibited a significant increase in menthol use across the study period and menthol use was nearly identical among smokers ages 26–34 years (50%) and ages 18–25 years (53%) in 2020. Taken together, the increase in menthol use among the older subgroup of young adults may reflect a trend in delayed initiation of cigarettes overall[1,33] and older new initiates are continuing the pattern seen among adolescents of initiating with menthol.[34] Indeed, that we found an increase in menthol use among those with nondaily smoking and those who consume fewer cigarettes each day may similarly reflect that menthol use may be becoming increasingly linked with experimental or intermittent smoking patterns, which are often linked with recent initiation, rather than established smoking patterns. It is also notable that cigar use was associated with greater odds of menthol cigarette use in 2020 although it was not possible to examine those using menthol cigars versus non menthol cigars in relation to menthol cigarette use and these patterns should be examined more closely in future research.

In 2020, the dramatic disparity between menthol use among NH black smokers, among whom non-daily and lower CPD are generally more common, versus NH white smokers, persisted unabated suggesting the need to continue to assess the impact of current tobacco control measures on menthol use by NH black individuals and develop new tobacco control measures that are focused on having a greater impact on reducing the disparity of menthol use among NH black individuals. Another notable finding was the increase and majority of menthol use among Hispanic adults over the study period (33.68% in 2008 to 47.55%

in 2019) and 51% in 2020, with a more rapid increase among Hispanic compared with NH white smokers. This finding is consistent with, and extends, prior data on menthol cigarette smoking among Hispanic individuals.[35,36] Despite over half of Hispanic smokers using menthol, there is a paucity of research in this area. There are a number of possible explanations for the increased popularity of menthol cigarettes among Hispanic smokers. First, the increase may be due in part to the popularity of mentholated capsule cigarettes (e.g. Camel Crush) among Hispanic smokers.[37] In addition, there is evidence of greater marketing of menthol cigarettes to Hispanic adults[38] although some results are mixed and more research is needed in this area.[39] Nonmenthol smokers who are Hispanic may also be switching to menthol cigarettes at faster rates than nonmenthol smokers from other ethnic groups. A study of college students in Texas found that Hispanic/Latino smokers had an increased risk of switching from non menthol to menthol cigarettes compared with NH white smokers.[38] Future research should focus on examining the factors that drive menthol use among Hispanic cigarette smokers, and examining how and whether a ban may affect use among black and Hispanic adults.

This study has limitations. First, data from noninstitutionalized U.S. individuals may not generalize to other groups, such as incarcerated individuals or individuals in other countries. Second, NSDUH uses a repeated cross-sectional design, therefore longitudinal patterns of use cannot be examined. Third, data are self-reported, which can result in memory errors or biases, such as recall bias. However, self-reported smoking behavior is standard practice in large-scale, national surveys.[39] Fourth, NSDUH does not include variables that would be helpful in understanding certain findings, such as reasons for menthol use. Fifth, data for 2020 were not statistically comparable to 2019 and earlier so trend analyses could not include data from 2020.

Conclusions

Menthol cigarettes have had an enormous impact on public health in the United States. Our findings build upon the body of evidence demonstrating that tobacco use disparity groups bear a disproportionate burden of menthol cigarette use, especially young people, racial/ethnic minoritized populations, and those with mental health problems. Given the association between menthol cigarette smoking and initiation, progression to established smoking, cigarette dependence, and poor cessation outcomes,[4–6] the increase in menthol use among subgroups of smokers identified in this study may be exacerbating tobacco use disparities. Accordingly, these findings suggest that a ban on menthol cigarettes, which could promote smoking cessation and reduce initiation in the United States,[40] also has the potential to contribute to efforts to reduce these inequities. Future studies should continue to monitor menthol use among different subpopulations of adults who use cigarettes and examine the impact of a menthol ban, if enacted, on cigarette use in the United States.

Declaration of Interest

None of the authors have any conflicts of interest to report.

Data Availability

The NSDUH data analyzed here are publicly available.

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