

# The intersection of gender and race/ethnicity in smoking behaviors among menthol and non-menthol smokers in the United States

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## ABSTRACT

**Aims** To determine whether menthol is related to initiation, quantity or quitting, we examined differences in smoking behaviors among menthol and non-menthol smokers, stratified by gender and race/ethnicity, and adjusting for age, income and educational attainment. **Design** Cross-sectional, using data from the 2005 National Health Interview Survey and Cancer Control Supplement. **Setting** United States. **Participants** Black, Hispanic and white women and men aged 25–64 years. **Measurements** For each group, we examined (i) proportion of menthol smokers (comparing current and former smokers); (ii) age of initiation, cigarettes smoked per day and quit attempt in the past year (comparing menthol and non-menthol current smokers); and (iii) time since quitting (comparing menthol and non-menthol former smokers). We calculated predicted values for each demographic group, adjusting for age, income and educational attainment. **Findings** After adjusting for age, income and education, black (compared with Hispanic and white) and female (compared with male) smokers were more likely to choose menthol cigarettes. There was only one statistically significant difference in age of initiation, cigarettes smoked per day, quit attempts or time since quitting between menthol and non-menthol smokers: white women who smoked menthol cigarettes reported longer cessation compared with those who smoked non-menthol cigarettes. **Conclusions** The results do not support the hypothesis that menthol smokers initiate earlier, smoke more or have a harder time quitting compared with non-menthol smokers. A menthol additive and the marketing of it, given the clear demographic preferences demonstrated here, however, may be responsible for enticing the groups least likely to smoke into this addictive behavior.

**Keywords** Gender, menthol, race/ethnicity, socio-economic factors.

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## INTRODUCTION

Menthol cigarettes account for more than one-quarter of all cigarettes sold in the United States [<http://www.ftc.gov/reports/cigarette05/050809cigrpt.pdf>]. The data are inconclusive as to whether smoking menthol cigarettes is more harmful for one's health than smoking non-menthol cigarettes [1–13]. Adding menthol to cigarettes, however, improves the flavor, makes smoking seem less harsh and hides symptoms of disease for many smokers. Furthermore, menthol cigarettes are also marketed in ways that foster perceptions that they are less harmful than non-menthol cigarettes, although no evi-

dence exists to support that claim [14–16]. Therefore, the effect of menthol may be to encourage smoking initiation and hinder cessation efforts [1]. If so, it is plausible to hypothesize that menthol smoking results in an increase in prevalence of smoking and in the incidence of smoking-related diseases.

It has been documented that black and female smokers choose menthol cigarettes at higher rates than other groups of smokers [17], and that tobacco companies have targeted African Americans and women in marketing efforts [14–16]. Less well known is whether smoking behaviors (initiation, quantity, quitting) also differ according to cigarette choice. We also do not know

how differences in socio-economic position by race/ethnicity and gender influence observed patterns in menthol use. Our objective, therefore, was to examine demographic differences in smoking behaviors among menthol and non-menthol smokers in the United States, while directly addressing the intersection of gender, race/ethnicity and socio-economic position. We examine age of smoking initiation, quantity smoked, quit attempts and length of time since quitting among demographic subgroups, adjusting for differences in age, income and educational attainment.

## METHODS

We used cross-sectional data in the United States from the 2005 National Health Interview Survey (NHIS) sample adult file linked with the Cancer Control Supplement ( $n = 31\,428$  aged 18 years and over) for our descriptive, stratified study. The NHIS is a continuing annual household interview survey based on a multi-stage area probability design and represents the civilian non-institutionalized population of the United States ([http://www.cdc.gov/nchs/nhis/about\\_nhis.htm](http://www.cdc.gov/nchs/nhis/about_nhis.htm)). Its main objective is to monitor the health of the population through the collection and analysis of data on a broad range of health topics that can be classified by demographic and socio-economic characteristics. The NHIS has a response rate that is close to 90% of eligible households. The sample adult file includes one randomly selected adult, aged 18 and over; sample adults also completed the Cancer Control Supplement, which included further details on tobacco use, including questions on menthol cigarettes. The analytical sample included women and men aged 25–64 who self-identified as (i) black, non-Hispanic/Latino; (ii) Hispanic/Latino; or (iii) white, non-Hispanic in the sample adult file. Six demographic groups were defined according to gender and race/ethnicity (black women, black men, Hispanic women, Hispanic men, white women and white men).

Smoking behaviors by menthol status were examined for each demographic group. Because of the different distributions of socio-economic position by race/ethnicity and gender, and because of the strong associations between smoking and socio-economic position, we adjusted the estimates of smoking behaviors by both income and education. Using imputed income files from the National Center for Health Statistics for respondents with unknown income, income was defined as the ratio of total annual family income to the federal poverty threshold (0–100%, 101–200%, 201–400%, 401+% of the federal poverty level, or FPL). Education was defined as the highest level of school completed [not a high school graduate, high school graduate/general educational development (GED), some college, college graduate].

Current smokers responded that they had smoked at least 100 cigarettes and currently smoke some days or every day. Former smokers responded that they had smoked at least 100 cigarettes and currently do not smoke. Never smokers responded that they had not smoked at least 100 cigarettes. Menthol cigarette use was ascertained by asking whether the usual cigarette brand was menthol (in the 12 months before quitting, for former smokers). Respondents who reported ‘no usual type’ or ‘don’t know’ or who refused the question or whose information was not ascertained were excluded from all analyses (12% of former smokers and 7% of current smokers). The final analytical sample size was 21 196, including all current, former and never smokers. Among those, 3902 were current every day smokers and 3786 were former smokers.

For each demographic group, we examined (i) proportion of menthol smokers among every day and former smokers; (ii) age of initiation among menthol and non-menthol every day smokers; (iii) number of cigarettes smoked per day among menthol and non-menthol every day smokers; (iv) proportion with a quit attempt in the past year among menthol and non-menthol every day smokers; and (v) time since quitting among menthol and non-menthol former smokers. All analyses were weighted, age-, income- and education-adjusted, and accounted for the complex sample design of the NHIS. The income and education adjustments were made to account for well-documented differences in overall smoking rates and smoking behavior across the socio-economic spectrum. All analyses were conducted using SUDAAN software, version 10, 2008 (Research Triangle Institute, Cary, NC, USA) to produce predicted estimates. Comparisons can be made across a variety of possible subgroups including racial/ethnic differences, gender differences and smoking status or type differences. Because of multiple comparisons—and thus the increased chance of concluding statistical differences based on chance alone—differences were considered to be statistically significant at the more stringent significance level of  $P < 0.01$  rather than the usual  $P < 0.05$ .

## RESULTS

Figure 1 presents the smoking status distribution for six demographic groups by cigarette type (menthol versus non-menthol) among former, some days and every day smokers. Among both women and men, Hispanics have the highest proportion who never smoked (79% for women, 64% for men) and whites have the lowest proportion (57% for women, 50% for men). In contrast, the proportion of former smokers and every day smokers were highest among white women and men when compared with the other racial/ethnic groups. Proportions of

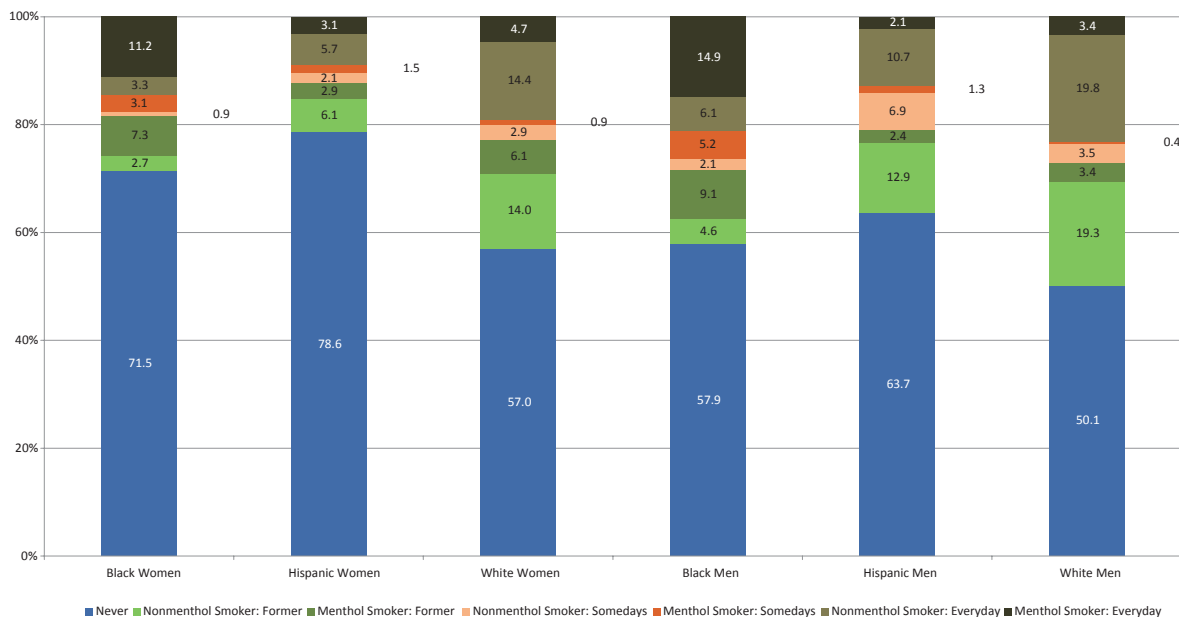


Figure 1 Distribution of smoking status by race/ethnicity, gender and cigarette type, National Health Interview Survey, 2005, n = 21 196

Table 1 Predicted\* prevalence of menthol cigarette type among current every day and former smokers by gender and race/ethnicity, National Health Interview Survey, 2005, n = 7688.

	Every day smokers						Former smokers					
	Black		Hispanic		White		Black		Hispanic		White	
	%	99% CI	%	99% CI	%	99% CI	%	99% CI	%	99% CI	%	99% CI
Women	77.9	71.1, 84.7	35.6	25.6, 45.7	24.5	21.4, 27.7	72.7	63.9, 81.6	34.9	24.7, 45.1	30.4	26.9, 33.8
Men	69.7	61.5, 77.8	16.5	9.2, 23.8	14.6	11.9, 17.3	66.0	55.7, 76.4	14.5	7.7, 21.3	15.2	12.8, 17.6

\*Age-, income- and education-adjusted. CI: confidence interval.

some days smokers were comparable among women. The rate for white men was about half that for black and Hispanic men (4% versus 7–8%). For each group, a higher proportion of women have never smoked than men (7–12% gender difference).

Menthol compared to non-menthol use shows a markedly different profile. Of most interest is that menthol use is much more prevalent among black women and men regardless of smoking status when compared to Hispanic and white women and men (almost four times higher among black women and two times higher among black men).

Given the differences between some days and every smokers in demographic, psychological and addiction characteristics, as well as their increasing prevalence in the United States [18–23], our preference was to examine some days smokers separately from every day smokers. However, small sample sizes of some days smokers prevent this analytical approach and are thus excluded

from further analyses. The demographic comparisons presented here, therefore, may be conservative as women and black smokers are more likely to be some days smokers. This analysis focuses only on those members of each subpopulation who declare themselves to be every day smokers and, thus, at higher risk of smoking-related illnesses.

Tables 1–5 present age-, income- and education-adjusted results stratified by smoking status or type, gender and race/ethnicity. For each set of results, we examine group differences by race/ethnicity, gender and smoker status or cigarette type.

#### Current and former smokers who choose menthol cigarettes

In Table 1 we examine the demographic characteristics of every day and former smokers who usually smoke menthol cigarettes. For both women and men, menthol

**Table 2** Predicted\* mean age of initiation by cigarette type among current every day smokers by gender and race/ethnicity, National Health Interview Survey, 2005, *n* = 3902.

	<i>Menthol</i>						<i>Non-menthol</i>					
	<i>Black</i>		<i>Hispanic</i>		<i>White</i>		<i>Black</i>		<i>Hispanic</i>		<i>White</i>	
	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>
Women	19.8	18.9, 20.8	19.9	18.0, 21.9	17.7	17.0, 18.5	19.2	17.4, 20.9	19.9	18.2, 21.6	17.5	17.1, 17.8
Men	18.6	17.8, 19.5	20.5	17.6, 23.5	17.2	16.3, 18.1	17.5	16.0, 19.1	18.6	17.6, 19.7	17.1	16.7, 17.5

\*Age-, income- and education-adjusted. CI: confidence interval.

**Table 3** Predicted\* mean number (#) of cigarettes smoked per day by type among current every day smokers by gender and race/ethnicity, National Health Interview Survey, 2005, *n* = 3902.

	<i>Menthol</i>						<i>Non-menthol</i>					
	<i>Black</i>		<i>Hispanic</i>		<i>White</i>		<i>Black</i>		<i>Hispanic</i>		<i>White</i>	
	<i>#</i>	<i>99% CI</i>	<i>#</i>	<i>99% CI</i>	<i>#</i>	<i>99% CI</i>	<i>#</i>	<i>99% CI</i>	<i>#</i>	<i>99% CI</i>	<i>#</i>	<i>99% CI</i>
Women	11.5	10.0, 13.0	8.8	6.7, 11.0	16.2	14.9, 17.5	11.7	9.4, 13.9	10.0	8.5, 11.4	16.9	16.2, 17.6
Men	13.9	12.1, 15.8	12.9	9.6, 16.2	18.9	17.3, 20.6	13.0	10.3, 15.7	12.5	10.6, 14.5	20.7	19.8, 21.6

\*Age-, income- and education-adjusted. CI: confidence interval.

**Table 4** Predicted\* quit attempt in the past year by cigarette type among current every day smokers by gender and race/ethnicity, National Health Interview Survey, 2005, *n* = 3902.

	<i>Menthol</i>						<i>Non-menthol</i>					
	<i>Black</i>		<i>Hispanic</i>		<i>White</i>		<i>Black</i>		<i>Hispanic</i>		<i>White</i>	
	<i>%</i>	<i>99% CI</i>	<i>%</i>	<i>99% CI</i>	<i>%</i>	<i>99% CI</i>	<i>%</i>	<i>99% CI</i>	<i>%</i>	<i>99% CI</i>	<i>%</i>	<i>99% CI</i>
Women	49.9	40.0, 59.9	46.7	27.8, 65.7	43.2	35.8, 50.7	39.7	24.3, 55.2	42.5	30.7, 54.3	39.8	35.7, 43.9
Men	48.6	37.1, 60.1	57.9	38.0, 77.8	40.7	31.2, 50.2	37.6	21.6, 53.6	38.4	28.3, 48.5	36.8	32.6, 41.0

\*Age-, income- and education-adjusted. CI: confidence interval.

**Table 5** Predicted\* mean length of time since quitting (in years) by cigarette type among former smokers by gender and race/ethnicity, National Health Interview Survey, 2005, *n* = 3786.

	<i>Menthol</i>						<i>Non-menthol</i>					
	<i>Black</i>		<i>Hispanic</i>		<i>White</i>		<i>Black</i>		<i>Hispanic</i>		<i>White</i>	
	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>	<i>Years</i>	<i>99% CI</i>
Women	13.0	10.6, 15.4	13.8	11.4, 16.3	14.8	13.4, 16.2	12.2	8.1, 16.2	12.2	10.2, 14.2	12.5	11.6, 13.4
Men	11.7	9.1, 14.4	14.2	10.4, 18.0	14.6	12.5, 16.7	10.6	7.6, 13.7	14.6	12.7, 16.6	13.9	13.1, 14.8

\*Age-, income- and education-adjusted. CI: confidence interval.

use rates are higher among blacks when compared to Hispanics or whites, for both every day and former smokers, and these differences were statistically significant ( $P < 0.01$ ). For example, among every day smokers, the predicted percentage smoking menthol among black women was 78% versus 36% for Hispanic and 25% for white women. Comparing across gender, white and Hispanic women were significantly more likely to choose menthol cigarettes compared to their male counterparts (among both every day and former smokers) ( $P < 0.01$ ). Finally, comparing cigarette choice within each demographic group, only among white women was there a statistically significant difference, whereby former smokers were more likely to choose menthol (30%) compared with every day smokers (25%) ( $P < 0.01$ ).

#### Age of initiation among current smokers

Table 2 presents predicted mean age of smoking initiation by cigarette type among every day smokers. Nearly all groups started smoking as teenagers. Among menthol smokers, white women and men started smoking earlier than their black and Hispanic counterparts, about 2 years younger for white women and 1.5–3 years younger for white men. Among non-menthol smokers, white women and men also started smoking at an earlier age, but the differences were only significant in comparison with Hispanic women and men (about 2 years difference) ( $P < 0.01$ ). There were no gender differences for any racial/ethnic group for either cigarette type. In addition, within each demographic group, there were no differences in age of initiation by type of cigarette. For example, both menthol and non-menthol smoking Hispanic women began smoking just before they reached age 20 years. It should be noted that the cigarette type is assessed at the time of interview not at the time of smoking initiation. The NHIS does not contain questions about the type of cigarette smoked at initiation.

#### Quantity smoked among current smokers

Table 3 is similar in format to Table 2. This table contains the predicted mean number of cigarettes smoked daily by current smokers by type of cigarette. For each cigarette type, white women and men smoked about five to eight more cigarettes per day than their black and Hispanic counterparts (statistically significant,  $P < 0.01$ ), with white men reporting the highest amount at about a pack per day. Comparing gender groups, for all except black non-menthol smokers, men smoked significantly more cigarettes per day than women ( $P < 0.01$ ). For instance, white men who smoked menthol cigarettes smoked about 19 per day compared with about 16 per day among white women who smoked menthol cigarettes. There were no

significant differences for any group in the number of cigarettes smoked per day by cigarette type (menthol versus non-menthol).

#### Quit attempts among current smokers

Table 4 presents quit attempts among current smokers. About 37–58% of adults reported a quit attempt in the past year. There were no statistically significant differences by race/ethnicity, gender or cigarette type. However, the trend for both genders and all racial/ethnic groups was that menthol smokers had higher levels of quit attempts compared with non-menthol smokers; differences were as great as 10–20%.

#### Quit duration among former smokers

Table 5 examines the average length of time in years since former smokers quit by the type of cigarette they smoked when they smoked regularly. The length of quitting may suggest differences in the addictive nature of cigarette type or demographic differences in the success of quit attempts. On average, former smokers had abstained from smoking for about 11–15 years. Among those who smoked menthol cigarettes, there were no racial/ethnic or gender differences in length of time. However, among those who smoked non-menthol cigarettes, several statistically significant differences were found: black men (11 years) had not abstained as long as had Hispanic (15 years) or white men (14 years) and white women had not abstained as long as had white men ( $P < 0.01$ ). Comparing length of time by cigarette type among the six demographic groups, only among white women was there a statistically significant difference whereby menthol smokers (15 years) had abstained about 2.5 years longer than non-menthol smokers (12.5 years) ( $P < 0.01$ ).

## DISCUSSION

The results of this stratified, descriptive analysis of demographic patterns in smoking behavior among individuals who choose menthol versus non-menthol cigarettes are instructive. As previous work has shown [1,17], blacks and women are much more likely to choose menthol cigarettes, and whites initiate at an earlier age and smoke a greater quantity [24,25] compared with other groups. Moreover, the lack of significant differences in smoking behavior patterns among menthol versus non-menthol smokers suggest that menthol smokers do not start smoking earlier, do not smoke more and do not have a harder time quitting (i.e. making a quit attempt and length of time since quitting).

Plausible biological mechanisms and pharmacological evidence suggest that menthol cigarettes contribute to initiation/addiction and hinder quitting [1–4,26]. The



epidemiological evidence, however, does not always bear this out; for example, Hyland *et al.* found that menthol cigarettes were not associated with indicators of addiction or with quitting in the Community Intervention Trial for Smoking Cessation (COMMIT) study [27]. Our descriptive results do not suggest that menthol smokers start smoking earlier or have less success at quitting. Furthermore, whether smoking menthol cigarettes increases the risk of cancer and cardiovascular disease relative to non-menthol smokers has not been firmly established [1–13]. Therefore, we can only speculate that the higher rates among blacks for smoking-related cancer and cardiovascular disease mortality observed in the epidemiological literature [28] may have more to do with health care inequalities (access and treatment), environmental conditions (e.g. toxic exposures, stressful neighborhood and working conditions) and/or nicotine intake [29] than with cigarette type. Further research is needed to elucidate more fully the complex relationships between cigarette type, smoking behaviors and topography, addiction/cessation and health consequences.

Several limitations deserve mention. All people who self-identified as Hispanic were combined to maximize sample size. This obviously limits our ability to detect differences between Hispanic/Latino subgroups. Because ‘some days’ smokers represented a small proportion of the overall sample—and have very different smoking characteristics compared with ‘every day’ smokers—they could not be included in the tabulations separately or combined with ‘every day’ smokers. Multiple sequential years of administering the NHIS Cancer Control supplement ought to alleviate some, if not all, of these sample size limitations. Finally, for the age of initiation tabulation, we have no information indicating whether respondents started out smoking menthol or non-menthol cigarettes and remained consistent with their initial choice. We adjusted our predicted values by only two socio-economic dimensions, income and educational attainment, measured only at the individual or family level, and at a single time in the life cycle. In initial analyses, we stratified our analyses by income and education rather than providing multivariate adjustments for these covariates. We found very few within-group differences by socio-economic status with the exception of white men. In part, we believe this to be an artifact of sample size as well as much higher prevalence of smoking among white men. Thus, we chose to adjust the comparisons rather than provide within-group comparisons across socio-economic status. We also did not assess income sources, accumulated wealth, quality of education, occupational status or other socio-economic factors that vary by race/ethnicity and gender. Thus, as in nearly all studies of racial/ethnic disparities [30,31], some residual confounding by socio-economic position prob-

ably exists. Finally, the findings may not apply to teens, the time at which most smokers initiate smoking.

Despite these limitations, we hope that this study makes an important contribution to the social epidemiology of menthol smoking. We did not find that mentholated cigarettes might encourage initiation and hinder cessation among a nationally representative sample of non-elderly adults. A menthol additive and the marketing of it, given the clear demographic preferences demonstrated here, however, may be responsible for enticing the groups least likely to smoke into this addictive behavior.

#### Declarations of interest

None.

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