

Quit Attempts and Quit Rates Among Menthol and Nonmenthol Smokers in the United States

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On June 22, 2009, the Family Smoking Prevention and Tobacco Control Act was signed into law, granting the US Food and Drug Administration (FDA) the authority to regulate tobacco products by establishing the Center for Tobacco Products (CTP). As one of the first activities of the CTP, the FDA will review evidence on the impact of menthol in cigarettes on the public health to determine whether to recommend removal of mentholated cigarettes from the US market. Regarding the process of making decisions for a proposed ban on menthol in cigarettes, the act specifies that scientific evidence be considered with a broad population-based standard rather than a narrow individual standard. Specifically, the CTP must consider (1) the risks and benefits to the population as a whole, including users and nonusers of tobacco products, (2) the increased or decreased likelihood that existing users of tobacco products will stop using such products, and (3) the increased or decreased likelihood that those who do not use tobacco products will start using such products.¹

In 2008, more than one third (33.9%) of past-month smokers aged 12 years and older reported smoking menthol cigarettes²; this rate equates to more than 10 million menthol smokers in the United States.³ The prevalence of menthol cigarette use is highest among Black smokers (82.6%) and young smokers (44.8%)²—2 groups that have been the target of menthol cigarette marketing by the tobacco industry.^{4–6} Studies of youths indicate that menthol flavoring affects smoking initiation, with higher proportions of recent initiates smoking mentholated cigarettes compared with those who have been smoking more than 1 year,^{2,7} and that middle-school smokers are more likely to smoke menthol cigarettes than are high-school smokers.⁷

Recent research also suggests that smoking menthol cigarettes negatively influences smoking cessation among adults. One

Objectives. We compared quit attempts and quit rates among menthol and nonmenthol cigarette smokers in the United States.

Methods. We used data from the 2003 and 2006–2007 waves of the large, nationally representative Tobacco Use Supplement to the Current Population Survey with control for state-level tobacco control spending, prices, and smoke-free air laws. We estimated mean prevalence, quit rates, and multivariate logistic regression equations by using self-respondent weights for menthol and nonmenthol smokers.

Results. In 2003 and 2007, 70% of smokers smoked nonmenthol cigarettes, 26% smoked menthol cigarettes, and 4% had no preference. Quit attempts were 4.3% higher in 2003 and 8.8% higher in 2007 among menthol than nonmenthol smokers. The likelihood of quitting was 3.5% lower for quitting in the past year and 6% lower for quitting in the past 5 years in menthol compared with nonmenthol smokers. Quit success in the past 5 years was further eroded among menthol-smoking Blacks and young adults.

Conclusions. Menthol smokers are more likely to make quit attempts, but are less successful at staying quit. The creation of menthol preference through marketing may reduce quit success. (*Am J Public Health*. Published online ahead of print May 12, 2011: e1–e7. doi:10.2105/AJPH.2011.300178)

randomized controlled study showed no difference in 7-day point prevalence abstinence between menthol and nonmenthol smokers at 6 months,⁸ but 2 other studies^{9,10} reported reduced cessation among menthol smokers, though results were not consistent across all follow-up time points. Of 5 population studies examining differences in smoking cessation by menthol cigarette use,^{11–15} the 2 more recent studies reported significantly lower quit rates among menthol smokers compared with nonmenthol smokers at follow-up.^{13,15} Gandhi et al.¹⁵ and Gundersen et al.¹³ also highlighted reduced cessation among Black and Latino menthol smokers. Few studies have explored the impact of menthol cigarette use on smoking cessation in large population-based studies. We used a large, recent national- and state-representative data set to examine quit rates among menthol and nonmenthol cigarette smokers. Unlike previous population studies, we explicitly considered the role of quit attempts and also controlled for the state tobacco control policies.

METHODS

We used a logistic regression analysis to examine quitting behaviors. We combined individual-level data from the large-scale national- and state-representative Tobacco Use Supplement (TUS) to the Current Population Survey with state-level data on tobacco control policies.

Individual-Level Data

Two waves of the TUS contain information on menthol cigarette use: the 2003 wave reflects the sample months February, June, and November, and the 2006–2007 wave reflects data from May and August of 2006 and January of 2007. The sample was limited to self-respondents aged 18 years and older, which produced a sample size of 34 260 in the 2003 wave and 31 250 in the 2007 wave.

Self-respondents were first screened for “ever use” of tobacco, based on whether they had smoked at least 100 cigarettes in their lifetime. Those who reported that they had

TABLE 1—Quit Attempts and Quit Rates by Cigarette Type Preference Among US Smokers: 2003 and 2007 Tobacco Use Supplement to the Current Population Survey

Cigarette Preference	Total Smokers, %	Quit Attempt in the Past Year		Quit ≥ 3 Months and ≤ 1 Year		Quit ≥ 3 Months and ≤ 5 Years	
		%	Difference From Nonmenthol, %	%	Difference From Nonmenthol, %	%	Difference From Nonmenthol, %
2003 Total	100.0	39.4		4.3		20.8	
Nonmenthol	70.0	39.3		4.4		21.2	
Menthol	25.9	40.9	4.3	4.2	-3.9	18.8	-11.3
No preference	4.2	28.8	-26.7	4.8	8.6	32.4	53.1
2007 Total	100.0	38.8		4.6		20.7	
Nonmenthol	70.2	38.1		4.6		21.2	
Menthol	25.7	41.4	8.8	4.1	-12.2	18.3	-13.8
No preference	4.1	35.4	-7.1	7.5	61.0	31.6	48.7

smoked at least 100 cigarettes in their lifetime were asked about current smoking status. Individuals who smoked at least 100 cigarettes in their lifetime but did not currently smoke were classified as former smokers.

Former smokers were asked when they had completely quit smoking, and were categorized as (1) “recent quitters”: those who quit in the past year and have been quit for at least 3 months, and (2) “longer-term quitters”: those who quit in the past 5 years and have been quit for at least 3 months. For recent quitters, the sample included those who answered that they smoked every day or some days to the question, “Around this time 12 months ago, were you smoking every day, some days, or not at all?” The sample to observe longer-term quitters included current smokers and those who have been quit for up to 5 years. Following Burns,¹⁶ we excluded those who quit less than 3 months ago from both the longer-term and recent-quit samples because about 65% of quitters relapse with the first 3 months.¹⁷

We also examined quit attempts among every-day and some-day smokers during the past year. Among those individuals who were smokers 1 year ago, a respondent was considered to have made a quit attempt if (1) he or she was a smoker 1 year ago but currently quit, or (2) he or she was a current smoker but answered yes to 1 of the following questions: “During the past 12 months, have you tried to quit smoking completely?” or “Have you ever stopped smoking for 1 day or longer because you were trying to quit smoking?”

Current smokers and former smokers who quit within the past 5 years were asked, “Is/Was your usual cigarette brand menthol or nonmenthol?” Response categories included menthol, nonmenthol, or no usual type, and were distinguished as such for our analyses.

To assess the level of nicotine addiction among respondents, we created a dichotomous variable to indicate whether a respondent smoked in the first 30 minutes after waking. To measure quantity smoked, we originally distinguished 4 categories: less than 5, 5 to 14, 15 to 24, and 25 or more cigarettes per day, but collapsed the second and third categories because cessation rates for these 2 categories were very similar.

We created variables from the TUS to control for sociodemographic characteristics that can influence cessation behavior. We categorized race/ethnicity as non-Hispanic White, non-Hispanic Black, Hispanic, Asian or Pacific Islander, and Other. We dichotomized gender with male as the reference group, and dichotomized age as young adults (aged 18 to 24 years) and adults (aged 25 years and older). We coded marital status with 4 categories: married, widowed or divorced, separated, and never married. We categorized educational attainment as less than high school diploma, high school diploma or general equivalency

TABLE 2—Logistic Regression of Quit Attempts During the Past Year for US Smokers Smoking 1 Year Ago: Pooled 2003 and 2007 Data From the Tobacco Use Supplement to the Current Population Survey

Covariate	Quit Attempts During the Past Year for Those Smoking 1 Year Ago		
	Model 1, AOR (95% CI)	Model 2, AOR (95% CI)	Model 3, AOR (95% CI)
Gender ^a	1.12** (1.12, 1.12)	1.07** (1.07, 1.07)	1.10** (1.10, 1.10)
Age, y			
18–24 (Ref)	1.00	1.00	1.00
25–44	0.69** (0.69, 0.70)	0.74** (0.74, 0.74)	0.72** (0.72, 0.72)
45–64	0.54** (0.54, 0.54)	0.60** (0.60, 0.60)	0.57** (0.57, 0.58)
≥ 65	0.50** (0.50, 0.50)	0.52** (0.52, 0.52)	0.52** (0.52, 0.52)
Marital status			
Married (Ref)	1.00	1.00	1.00
Widowed or divorced	0.93** (0.93, 0.93)	0.95** (0.95, 0.95)	0.94** (0.94, 0.95)
Separated	1.01** (1.01, 1.01)	1.04** (1.03, 1.04)	1.04** (1.03, 1.04)
Never married	0.94** (0.94, 0.94)	0.93** (0.93, 0.93)	0.94** (0.94, 0.94)
Education			
Less than high-school diploma (Ref)	1.00	1.00	1.00
High-school diploma or GED	1.16** (1.16, 1.16)	1.13** (1.13, 1.13)	1.12** (1.12, 1.13)
Associate degree or some college	1.47** (1.47, 1.48)	1.37** (1.37, 1.38)	1.40** (1.39, 1.40)
Undergraduate degree	1.52** (1.52, 1.53)	1.328** (1.32, 1.32)	1.39** (1.39, 1.39)
Graduate-level education	1.46** (1.45, 1.46)	1.25** (1.25, 1.25)	1.33** (1.32, 1.33)

Continued

TABLE 2—Continued

Race/ethnicity			
Non-Hispanic White (Ref)	1.00	1.00	1.00
Non-Hispanic Black	1.35** (1.35, 1.35)	1.22** (1.22, 1.23)	1.07** (1.07, 1.07)
Asian or Pacific Islander	1.07** (1.07, 1.07)	0.96** (0.96, 0.97)	1.02** (1.01, 1.02)
Hispanic	1.23** (1.22, 1.23)	1.00 (1.00, 1.00)	1.12 (1.12, 1.12)
Other	1.28** (1.28, 1.29)	1.26** (1.25, 1.26)	1.29** (1.28, 1.29)
Family income, US\$	1.00** (1.00, 1.00)	1.00** (1.00, 1.00)	1.00** (1.00, 1.00)
Indicator if income >\$175 000	0.85** (0.84, 0.85)	0.86** (0.86, 0.86)	0.87** (0.87, 0.88)
Policies			
Smoke-free air index	1.07** (1.06, 1.07)	1.04** (1.04, 1.04)	1.05** (1.05, 1.05)
Inflation-adjusted cigarette price	1.57** (1.56, 1.57)	1.50** (1.50, 1.51)	1.53** (1.53, 1.54)
Inflation-adjusted per-capita state funding	1.00** (1.00, 1.01)	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)
survey wave	1.00 (1.00, 1.00)	1.00** (0.99, 1.00)	1.00** (1.00, 1.00)
Cigarette type			
Nonmenthol (Ref)	1.00	1.00	1.00
Menthol	1.03** (1.02, 1.03)	1.02** (1.02, 1.03)	0.98** (0.98, 0.98)
No usual type	0.69** (0.69, 0.70)	0.63** (0.63, 0.63)	0.75** (0.75, 0.75)
Cigarettes smoked per day			
< 5 (Ref)		1.00	
5–24		0.68** (0.67, 0.68)	
≥ 25		0.51** (0.51, 0.51)	
Smoke < 30 mins after waking		0.73** (0.73, 0.73)	
Cigarette type × non-Hispanic Black			
Menthol			1.39** (1.39, 1.40)
No preference			0.62** (0.61, 0.62)
Cigarette type × age 18–24 y			
Menthol			1.04** (1.04, 1.04)
No preference			0.82** (0.81, 0.82)
Constant	0.35	0.64	0.44

Notes. AOR = adjusted odds ratio; CI = confidence interval; GED = general equivalency diploma. Adjusted for all other covariates in the model.

^a1 = women; 0 = men.

***P* < .001.

diploma, some college, an undergraduate degree, and graduate-level education. We collected data for household income and used the following ranges: \$0 to \$4999, \$5000 to \$9999, \$10 000 to \$14 999, \$15 000 to \$19 999, . . . , \$50 000 to \$59 999, \$60 000 to \$74 999, \$75 000 to \$99 999, \$100 000 to \$149 999, and \$150 000 or more. We created a continuous variable for income by assigning the midpoint of each range to each respondent, and for the highest category (\$150 000 and above), we assigned a value of \$160 000, then deflating the 2003 values by a consumer price index with 2007 as the base. Because the \$150 000 and above category was assigned an arbitrary value, we also included an indicator variable for that group.

State-Level Data: Tobacco Control Policies

Data related to tobacco control policies included state-level tobacco control expenditures, state cigarette prices, and state-level smoke-free air laws. We obtained the data from the ImpacTeen Web site (<http://www.impactteen.org>). State per capita expenditures included monies obtained from the state and the federal government to state health departments (e.g., the Centers for Disease Control and Prevention's National Tobacco Control Program), and funding from nongovernmental organizations (the Robert Wood Johnson Foundation's SmokeLess States Program and the American Legacy Foundation) and were apportioned to wave-month based on the data representing the

year midpoint. We obtained a state cigarette price that included generics from the widely used Tax Burden on Tobacco.¹⁸ The price and tobacco control expenditure variables were deflated by a consumer price index and adjusted to reflect tax changes that occurred since the month of the index and before the wave-month. We obtained state-level smoke-free air law data corresponding the wave-month to distinguish state smoking bans for private worksites, restaurants, and freestanding bars, each with a value of 3 if smoke-free, 2 if smoking was permitted in separate ventilated areas, 1 if smoking was permitted in separate areas, and 0 if there was no law. We developed an overall smoke-free air law index by doubling the value of the worksite values because of their potentially greater effect on cessation compared with smoke-free restaurants or bars.¹⁹ We summed and divided values by 12 resulting in values between 0 and 1.

Statistical Analysis

We used PASW version 18 (SPSS Inc, Chicago, IL) to estimate mean prevalence and logistic regression equations with individual-level weights supplied by the TUS. Mean prevalence is presented by wave. Because similar results were obtained when we used separate logistic equations for the 2003 and 2007 waves, we pooled data from both waves and included an indicator variable for the 2007 data. We estimated models both with and without the dependence variables to account for associations between menthol use, nicotine dependence, and quantity smoked.

We also considered models that examined the interaction of cigarette type (menthol, nonmenthol, and no preference) with the demographic, policy, and addiction variables. We report results of interactions between menthol cigarette preference or no type preference, Black race, and young adult age (6 variables in total) based on differences in the mean quit rates and in the stability of results in the regression equations. We included these variables to examine differential effects of age and race on cigarette type preference.

RESULTS

We first report mean quit rates and quit attempts by year, and then present our pooled

analysis over both years of analysis controlling for the effect of other factors.

Means

Table 1 presents the proportions of smokers and former smokers who quit within the past 5 years by cigarette type. In both 2003 and 2007, about 70% smoked nonmenthol, 26% smoked menthol, and 4% had no preference.

Table 1 also presents quit attempts and quit rates by cigarette type. Menthol smokers had a higher rate of quit attempts during the past year compared to nonmenthol smokers: 4.3% higher in 2003 and 8.8% higher in 2007.

Those with no preference had a lower quit attempt rate compared to nonmenthol smokers. Although they had a higher likelihood of a quit attempt, menthol smokers compared with nonmenthol smokers were 4% less likely to have quit successfully in the past year in 2003 and 12% less likely in 2007. Quit rates over the past 5 years were 11% lower in 2003 and 14% lower in 2007. Those who had no preference showed higher quit rates than nonmenthol (and menthol) smokers.

Logistic Regression Analysis

Tables 2, 3 and 4 present the results of multivariate logistic regression analysis for quit attempts and quit rates. In Table 2, models 1, 2, and 3 indicated that the likelihood of a quit attempt during the past year was higher among women; those who were married or separated; those with at least a high-school education; Hispanic, non-Hispanic Black, or Other race; and younger smokers (aged 18 to 24 years). The results also indicated that a quit attempt was more likely in states with higher cigarette prices, greater spending on tobacco control, and stronger smoke-free air laws. Whether we controlled for dependence (model 2) or not (model 1), the results indicate that those smoking menthol cigarettes were more likely than were nonmenthol smokers to make a quit attempt, and those with no cigarette type preference were less likely to make a quit attempt compared with nonmenthol smokers. However, results for model 3 indicate that the quit attempt rate for menthol smokers was higher for non-Hispanic Blacks compared to other racial/ethnic groups and for those aged 18 to 24 years compared to older age groups.

TABLE 3—Logistic Regression of Quits 3 Months or More and 1 Year or Less: Pooled 2003 and 2007 Data From US Smokers in the Tobacco Use Supplement to the Current Population Survey

Covariate	Quits ≥ 3 Months and ≤ 1 Year		
	Model 4, AOR (95% CI)	Model 5, AOR (95% CI)	Model 6, AOR (95% CI)
Gender ^a	1.31** (1.30, 1.31)	1.36** (1.36, 1.37)	1.30** (1.30, 1.31)
Age, y			
18-24 (Ref)	1.00	1.00	1.00
25-44	0.75** (0.75, 0.75)	0.72** (0.72, 0.73)	0.79** (0.79, 0.79)
45-64	0.63** (0.63, 0.64)	0.58** (0.58, 0.58)	0.68** (0.67, 0.68)
≥ 65	1.00 (0.99, 1.00)	0.94** (0.93, 0.94)	1.05** (1.05, 1.06)
Marital status			
Married (Ref)	1.00	1.00	1.00
Widowed or divorced	0.82** (0.81, 0.82)	0.81** (0.81, 0.82)	0.82** (0.81, 0.82)
Separated	0.82** (0.81, 0.82)	0.81** (0.81, 0.82)	0.82** (0.82, 0.83)
Never married	0.88** (0.88, 0.88)	0.90** (0.89, 0.90)	0.88** (0.87, 0.88)
Education			
Less than high-school diploma (Ref)	1.00	1.00	1.00
High-school diploma or GED	1.20** (1.20, 1.21)	1.19** (1.19, 1.19)	1.19** (1.19, 1.20)
Associate degree or some college	1.55** (1.54, 1.56)	1.58** (1.57, 1.58)	1.53** (1.53, 1.54)
Undergraduate degree	1.73** (1.72, 1.74)	1.88** (1.87, 1.89)	1.69** (1.69, 1.70)
Graduate-level education	1.87** (1.85, 1.88)	2.07** (2.05, 2.08)	1.83** (1.81, 1.84)
Race/ethnicity			
Non-Hispanic White (Ref)	1.00	1.00	1.00
Non-Hispanic Black	0.83** (0.83, 0.83)	0.92** (0.92, 0.92)	0.75** (0.74, 0.75)
Asian or Pacific Islander	0.71** (0.71, 0.72)	0.77** (0.77, 0.78)	0.70** (0.70, 0.71)
Hispanic	0.88** (0.88, 0.89)	1.06** (1.05, 1.06)	0.86** (0.86, 0.87)
Other	0.97** (0.96, 0.97)	1.00 (0.99, 1.01)	0.97** (0.96, 0.97)
Family income, US \$	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)
Indicator if income > \$175 000	**0.58 (0.57, 0.58)	0.60** (0.60, 0.61)	0.58** (0.58, 0.59)
Policies			
Smoke-free air index	1.07** (1.06, 1.07)	1.09** (1.08, 1.09)	1.06** (1.06, 1.07)
Inflation-adjusted cigarette price	0.99* (0.98, 1.00)	1.02** (1.01, 1.03)	0.98** (0.97, 0.99)
Inflation-adjusted per-capita state funding	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)
2007 survey wave	1.04** (1.04, 1.04)	1.04** (1.04, 1.04)	1.04** (1.04, 1.04)
Cigarette type			
Nonmenthol (Ref)	1.00	1.00	1.00
Menthol	0.97** (0.96, 0.97)	0.97** (0.96, 0.97)	0.92** (0.91, 0.92)
No usual type	1.31** (1.30, 1.31)	1.46** (1.45, 1.47)	1.37** (1.36, 1.38)
Cigarettes smoked per day			
< 5 (Ref)		1.00	
5-24		2.62** (2.61, 2.63)	
≥ 25		3.89** (3.87, 3.91)	
Smoke < 30 mins after waking		0.72** (0.72, 0.73)	
Cigarette type × non-Hispanic Black			
Menthol			1.24** (1.23, 1.25)
No preference			0.09** (0.08, 0.10)

Continued

TABLE 3—Continued

Cigarette type × age 18–24 y			
Menthol			1.14** (1.13, 1.15)
No preference			1.18** (1.16, 1.20)
Constant	0.03	0.01	0.03

Notes. AOR = adjusted odds ratio; CI = confidence interval; GED = general equivalency diploma. Adjusted for all other covariates in the model.

^a1 = women; 0 = men.

*P < .05; **P < .001.

In Table 3, models 4, 5, and 6 for quitting in the past year and more than 3 months indicated that quit rates were higher among women; those who were married; those who were more educated; those with higher income; Hispanics, non-Hispanic Whites, and Other race/ethnicity; and those aged 18 to 24 years. Those who smoked within 30 minutes of waking had lower quit rates than did less-dependent smokers. Those who reported no usual type of cigarettes were more likely to have quit smoking in the past year. The results also indicated that quit rates were higher among those menthol smokers who were non-Hispanic Black or aged 18 to 24 years. However, the 24% higher likelihood of a successful quit for a non-Hispanic Black menthol smoker was less than the 35% increased likelihood of a quit attempt for that group (model 3), indicating that quit success among those making a quit attempt was lower for non-Hispanic Black menthol smokers.

In Table 4, models 7, 8, and 9 for quitting in the past 5 years were generally consistent with results for quitting in the past year with a few exceptions: the likelihood of quitting was higher among those aged 65 years and older and lower among those who were classified as Other race. Household income was not associated with 5-year quit rates. Smoking within 30 minutes of waking remained associated with a lower likelihood of quitting within the past 5 years. Five-year quit rates were higher in states with greater spending on tobacco control, higher prices, and stronger smoke-free air laws, and were lower among non-Hispanic Black menthol smokers and menthol smokers aged 18 to 24 years compared with other menthol smokers.

For the models examining past-year and 5-year quit measures, quit rates were lower

among those who smoked menthol cigarettes compared with nonmenthol cigarettes; the likelihood of quitting was about 3.5% lower for those who quit in the past year and about 6%

lower for those who quit within the past 5 years. Controlling for dependence had minimal effects. Quit success within the past 5 years among menthol smokers was further reduced for non-Hispanic Blacks and those who were aged 18 to 24 years. The likelihood of quitting was between 30% and 75% higher among those smokers with no type preference compared with those who smoked a nonmenthol brand.

DISCUSSION

When we used a large representative sample for the United States in 2003 and 2007 and controlled for age, gender, race/ethnicity,

TABLE 4—Logistic Regression of Quits 3 Months or More and 5 Years or Less: Pooled 2003 and 2007 Data From US Smokers in the Tobacco Use Supplement to the Current Population Survey

Covariate	Quits ≥ 3 Months and ≤ 5 Years		
	Model 7, AOR (95% CI)	Model 8, AOR (95% CI)	Model 9, AOR (95% CI)
Gender ^a	1.09** (1.09, 1.09)	1.17** (1.17, 1.17)	1.09** (1.08, 1.09)
Age, y			
18–24 (Ref)	1.00	1.00	1.00
25–44	1.04** (1.04, 1.04)	0.98** (0.98, 0.98)	1.03** (1.03, 1.04)
45–64	0.99** (0.99, 0.99)	0.86** (0.86, 0.86)	0.98** (0.98, 0.99)
≥ 65	1.99** (1.99, 2.00)	1.80** (1.79, 1.80)	1.98** (1.97, 1.98)
Marital status			
Married (Ref)	1.00	1.00	1.00
Widowed or divorced	0.68** (0.68, 0.68)	0.68** (0.68, 0.68)	0.68** (0.68, 0.68)
Separated	0.59** (0.59, 0.59)	0.58** (0.58, 0.59)	0.59** (0.59, 0.59)
Never married	0.70** (0.70, 0.70)	0.71** (0.71, 0.71)	0.70** (0.70, 0.70)
Education			
Less than high-school diploma (Ref)	1.00	1.00	1.00
High-school diploma or GED	1.25** (1.25, 1.25)	1.24** (1.24, 1.25)	1.24** (1.24, 1.25)
Associate degree or some college	1.68** (1.68, 1.68)	1.74** (1.74, 1.74)	1.67** (1.67, 1.68)
Undergraduate degree	2.21** (2.21, 2.22)	2.52** (2.51, 2.52)	2.20** (2.19, 2.20)
Graduate-level education	2.52** (2.51, 2.53)	2.91** (2.90, 2.92)	2.51** (2.50, 2.51)
Race/ethnicity			
Non-Hispanic White (Ref)	1.00	1.00	1.00
Non-Hispanic Black	0.83** (0.82, 0.83)	0.96** (0.96, 0.96)	0.87** (0.86, 0.87)
Asian or Pacific Islander	0.81** (0.80, 0.81)	0.91** (0.91, 0.92)	0.80** (0.80, 0.81)
Hispanic	0.95** (0.95, 0.95)	1.22** (1.22, 1.22)	0.95** (0.94, 0.95)
Other	0.88** (0.87, 0.88)	0.91** (0.91, 0.92)	0.88** (0.87, 0.88)
Family income, US \$			
Indicator if income > \$175 000	1.00** (1.00, 1.00)	1.00** (1.00, 1.00)	1.00** (1.00, 1.00)
	0.72** (0.71, 0.72)	0.73** (0.73, 0.73)	0.72** (0.71, 0.72)

Continued

TABLE 4—Continued

Policies			
Smoke-free air index	1.10** (1.10, 1.11)	1.13** (1.13, 1.13)	1.10** (1.10, 1.11)
Inflation-adjusted cigarette price	1.10** (1.10, 1.11)	1.16** (1.15, 1.16)	1.10** (1.09, 1.10)
Inflation-adjusted per-capita state funding	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)	1.01** (1.01, 1.01)
2007 survey wave	0.98** (0.97, 0.98)	0.99** (0.99, 0.99)	0.98** (0.97, 0.98)
Cigarette type			
Nonmenthol (Ref)	1.00	1.00	1.00
Menthol	0.94** (0.94, 0.94)	0.95** (0.95, 0.95)	0.95** (0.95, 0.95)
No usual type	1.51** (1.51, 1.52)	1.74** (1.73, 1.74)	1.55** (1.54, 1.55)
Cigarettes smoked per day			
< 5 (Ref)		1.00	
5–24		3.09** (3.08, 3.09)	
≥ 25		5.55** (5.54, 5.56)	
Smoke < 30 mins after waking		0.73** (0.73, 0.73)	
Cigarette type × non-Hispanic Black			
Menthol			0.97** (0.97, 0.97)
No preference			0.51** (0.50, 0.51)
Cigarette type × age 18–24 y			
Menthol			0.94** (0.94, 0.94)
No preference			1.16** (1.15, 1.16)
Constant	0.11	0.04	0.11

Notes. AOR=adjusted odds ratio; CI=confidence interval; GED=general equivalency diploma. Adjusted for all other covariates in the model.

^a1 = women; 0 = men.

***P* < .001.

marital status, education, family income, state-level tobacco control policies, and survey year, we found that those who smoked menthol cigarettes were less likely to quit smoking, despite having a greater percentage of quit attempts compared to nonmenthol smokers. We found that additional adjustment for dependence (i.e., cigarettes per day and time to first cigarette after waking) did not substantially affect this relationship.

Although 3 earlier population studies^{11,12,14} did not find a difference in smoking cessation among menthol smokers compared with nonmenthol smokers, we found clear evidence of differences in quit rates between these groups. This study is more recent, of larger scale, and more representative of the population than the earlier studies. It also controlled for important potential confounders of the relationship between menthol cigarette use and smoking cessation. These results are consistent with 2 randomized controlled studies^{9,10} and 2 population studies^{13,15} showing lower cessation rates among Black menthol smokers compared

with Black nonmenthol smokers. However, unlike the study by Gundersen et al.¹³ that considered all former smokers, our sample of former smokers was limited to those who had quit within the past 5 years, thereby reducing the likelihood of recall bias or changes in cigarette type smoked. The results of our study are further supported by a recent analysis of the 2003 and 2007 TUS to the Current Population Survey data, which demonstrated significantly reduced cessation of at least 6 months among non-Hispanic Black, Hispanic/Latino, Asian American/Pacific Islander, and non-Hispanic White menthol smokers compared with nonmenthol smokers of the same races/ethnicities.²⁰

Results also indicate that menthol smokers aged 18 to 24 years had lower rates of quit success over the past 5 years. We also considered differential effects of quit rates for other subgroups. Unlike previous studies,^{13,15} we did not find that Hispanic menthol smokers had lower quit rates than did non-Hispanic White menthol smokers. Compared with nonmenthol

smokers, we found some evidence that menthol smokers who smoked more than 25 cigarettes per day had a lower likelihood of quitting, and menthol smokers who smoked within 30 minutes of waking had a slightly higher likelihood of quitting. Results also indicated that menthol smokers had lower quit rates in states with strong tobacco control policies, which may indicate that menthol smokers may be more committed to their menthol preference and resistant to giving it up. In another study,²¹ smokers of menthol were found to have stronger loyalty to their menthol preference and be less sensitive to price fluctuations than nonmenthol users. Such cigarette type loyalty suggests that some smokers may quit rather than switch cigarette type if menthol is banned. Further research is needed to understand the role of policy, dependence, price, and demographic factors with respect to menthol and cessation behavior.

This analysis diverges from past studies that only compared menthol and nonmenthol quit success by also examining whether smoking menthol cigarettes was related to the likelihood of making a quit attempt. The percentage of smokers making 1 or more quit attempts per year was greater among menthol than nonmenthol smokers, even after we controlled for other factors. These results indicate that menthol smokers were not less motivated to quit, as indicated by their increased tendency to make a quit attempt, but rather were less successful at staying quit. This study is also unique in that it considered smokers who reported no cigarette type preference. Although they were less likely to make a quit attempt, smokers with no cigarette type preference were more likely to remain quit compared with nonmenthol smokers. These results suggest that cigarette type preference may reduce quit success. However, the absence of menthol or nonmenthol preference may reflect less attachment to smoking. Further research is needed to understand how cigarette type preference is related to cessation behavior.

Findings from this study contribute to the existing research on the role of menthol in reducing the likelihood of successful cessation among adult smokers. Although menthol smokers were at least as likely to make a quit attempt during the past year, they were less

likely to successfully quit than were nonmenthol smokers. These results suggest that a ban on menthol in cigarettes may prompt existing smokers to quit, and underscore the need for enhanced access to free smoking cessation services and for public education targeted to menthol smokers who have the most difficulty quitting.

While determining whether to ban menthol as a flavoring, FDA's CTP is charged with using a broad public health standard of likelihood of benefits versus harms to the population at large, both to users and nonusers of tobacco products, rather than considering a narrow individual standard of whether menthol causes additional harm to current menthol smokers compared with nonmenthol smokers as the tobacco industry is suggesting.²² Contrary to tobacco industry claims, menthol is not simply a flavoring that caters to the taste preferences of certain demographic groups; the results of the present study are consistent with other findings that suggest it is harder for menthol smokers to stop smoking,^{9,10,13,15,20} exposing millions of smokers who want to quit but cannot do so to the known and devastating harms of smoking.²³ Moreover, menthol smokers who would otherwise quit expose nonsmokers to the harms of secondhand smoke, and children who live in their household are more likely to have preventable episodes of asthma and ear infections and a higher propensity to adopt smoking themselves.²⁴ Given the overwhelming disease and death caused by smoking, menthol has no redeeming value other than to make the poison go down more easily, maintain smoking among users who want to quit, and exposing others to their smoking.²⁵ ■

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Contributors

D. T. Levy developed the model and wrote the article. K. Blackman conducted the data analysis. A. Villanti, R. S. Niaura, D. M. Vallone, and D. B. Abrams suggested the original idea and contributed to the writing of the article. J. Tauras and F. J. Chaloupka helped to shape the analysis and contributed to the writing of the article.

Acknowledgments

We would like to thank Legacy for the funds that supported the preparation of this article.

Human Participant Protection

Institutional review board approval was not sought for this research.

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