Original investigation

Patterns of Longitudinal Transitions in Menthol Use Among U.S. Young Adult Smokers

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Abstract

Introduction: Menthol is the only characterizing flavor in cigarettes that was not banned as part of the 2009 Family Smoking Prevention and Tobacco Control Act. This longitudinal study explores the role of menthol in smoking initiation and progression. Purpose (a) to examine young adult patterns of menthol cigarette use including switching between menthol and non-menthol and (b) to describe associations between these patterns of menthol use and cessation related intentions and behaviors. Additional data on the role of menthol in cigarettes on smoking uptake and maintenance is needed to inform proposed policy making at the local, state, and national levels.

Methods: Using 3 time points from a longitudinal national sample of young adults aged 18–34 years ($N = 267$ smokers), patterns of menthol use over 1 year were defined among smokers as: (a) remained menthol smoker; (b) remained non-menthol smoker; (c) switched from menthol to non-menthol; and (d) switched from non-menthol to menthol. Associations were assessed between current menthol cigarette use and cessation intentions and behaviors.

Results: Significant predictors of current menthol cigarette use at 1 year included initiation with menthol ($OR = 8.26$), Black race ($OR = 23.60$), and higher scores on the Allen menthol taste subscale ($OR = 1.53$). Menthol smokers were more likely to report intention to quit but no differences existed between menthol and non-menthol users in ever making a quit attempt.

Conclusions: Most young adults stay with the product that they start smoking with. Menthol smokers were interested in quitting, but less interested in next 30-day action than non-menthol smokers.

Introduction

Following the enactment of the Family Smoking Prevention and Tobacco Control Act (FSPTCA) in June 2009,¹ fruit, candy, and clove characterizing flavorings in cigarettes were banned with the goal of reducing youth smoking initiation and progression to regular smoking.² Menthol is the only characterizing flavor in cigarettes that was not banned as part of the FSPTCA.

Evidence suggests that menthol plays an important role in increasing experimentation and progression to regular smoking among youth and young adults.³ Nationally representative cross-sectional surveys show an age gradient in menthol use, with the youngest smokers (aged 12–17) most likely to smoke mentholated cigarettes, followed by young adult smokers (aged 18–25).^{4–6} These surveys also documented an increase in menthol cigarette use among

young adults from 2004 to 2010, despite a decrease in non-menthol cigarette use over this time period.^{4,7} Younger smokers and recent initiates are more likely to use mentholated cigarettes than older smokers and those smoking for more than one year, respectively.^{8,9}

Few longitudinal studies have explored the role of menthol cigarettes in smoking initiation and progression. One study conducted from 2000 to 2003 in middle/high school students demonstrated that initiation of smoking with menthol cigarettes was associated with progression to established smoking and to higher levels of dependence compared with students initiating with non-mentholated cigarettes.¹⁰ Similar to other studies,^{11–13} these results argue that menthol facilitates smoking initiation and that mentholated cigarettes serve as starter tobacco products for youth and young adults.⁸

Given the high rates of menthol use among Black youth and young adults^{4–6} and increased nicotine dependence among young menthol smokers,^{3,8–10} another concern is that youth and young adult menthol users may have more difficulty quitting.^{3,14} One study examining cessation in a nationally representative sample of adults showed that young adults aged 18–24 who used menthol cigarettes were more likely to have reported a quit attempt in the past year but less likely to have quit over the past 5 years compared to non-menthol smokers.¹⁵

The purpose of the current study was (a) to examine patterns in menthol cigarette use and switching between menthol and non-menthol cigarettes over time in a nationally representative sample of young adult smokers ages 18–34 years, and (b) to describe associations between these patterns of menthol use and cessation-related intentions and behaviors.

Methods

Participants

The Legacy Young Adult Cohort Study was designed to understand the trajectories of tobacco use in a young adult population using a longitudinal sample. The detailed methods of this study have been described elsewhere.¹⁶ Briefly, the cohort is comprised of a nationally representative sample of young adults ages 18–34 drawn from GfK's KnowledgePanel®. KnowledgePanel® is an online panel of adults ages 18 and older that covers both the online and offline populations in the United States. The cohort was 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. Black and Hispanic young adults were oversampled to ensure sufficient sample sizes for subgroup analyses. The current study uses data from the cohort of participants who completed the first three surveys and either remained current cigarette smokers across all three time points ($n = 212$) or initiated cigarette smoking at Time 2 and remained cigarette smokers at Time 3 ($n = 58$). Three participants were missing cigarette brand (menthol versus non-menthol) at Time 3, so the resulting sample size was 267. Time 1 data were collected in July 2011, Time 2 data were collected in January 2012 and Time 3 data were collected in July 2012. This study was approved by the Independent Investigational Review Board, Inc., and online consent was collected before survey self-administration.

Measures

Sociodemographics

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 meet basic expenses, just meet basic expenses, meet needs with a little left, live comfortably). All variables were measured at Time 1, other than income, which was assessed at Time 2.

Menthol Cigarette Use

Current cigarette use and brand (menthol vs. non-menthol) was assessed at each survey wave. Current cigarette use (past 30 days) was assessed from the question “during the last 30 days, on how many days have you used any of the following tobacco products?” Those using cigarettes one or more days in the past 30 days were classified as current cigarette smokers. Cigarette users were then asked to describe their brand of cigarette (“what brand of cigarette do you typically use?”), as well as whether the product was “menthol” or “non-menthol.” A “menthol” answer or writing a menthol brand was classified as current menthol. At Time 1, participants were also asked to report whether the brand they currently used was the brand they used when they first started (Time 0); if they responded “no,” they were asked to identify the brand they used at initiation and whether that brand was menthol or non-menthol. The responses to these items were used to classify respondents as either menthol initiates or non-menthol initiates. Participants were then classified into one of four groups based upon their patterns of switching between menthol and non-menthol cigarettes over the three survey waves: (a) remained menthol smoker; (b) remained non-menthol smoker; (c) switched from menthol; and (d) switched from non-menthol.

Tobacco Use Characteristics

Time 1 tobacco use variables included self-identified smoking status (smoker, social/occasional smoker, ex-smoker/tried smoking, non-smoker) and social smoking behavior. Social smoking behavior was adapted from a measure used by Song and Ling¹⁷ and assessed using the item “Do you smoke cigarettes or use tobacco products alone or with others?” with the following response choices: (a) alone; (b) equally alone and with others; (c) mainly with others; and (d) only with others.

Menthol Attitudes and Beliefs

In 2010, Allen et al.¹⁸ developed and validated a scale to assess attitudes and beliefs about menthol among Black smokers. The current study used three of the five sub-scales composed of a total of 14 items rated on a 4-point Likert scale from “strongly disagree” to “strongly agree.” Each sub-scale was scored separately with higher scores indicating more positive attitudes/beliefs about menthol. The “medicinal effects” sub-scale described respondents' perceptions of the positive health effects of menthol cigarettes. The “less harmful” sub-scale assessed the belief that menthol cigarettes are less harmful than non-menthol cigarettes. The “taste/sensation” sub-scale addressed the taste, smell and cooling feeling of menthol. These items were assessed of all tobacco users at Time 2.

Cigarette-Smoking Cessation

Intention, confidence, and behavioral measures of quitting were assessed at Time 3. Intention to quit was measured by the question “If you do, when do you plan to quit smoking cigarettes totally and for good?” Answer choices included “within the next 30 days,” “within the next 6 months,” “longer than 6 months,” and “I don't plan on quitting.” The following question measured confidence to

quit “How confident are you that you can quit smoking totally and for good if and when you wanted to?” Answer choices included “very confident,” “fairly confident,” “not very confident,” and “not at all confident.” Behavioral measures asked “Within the past 6 months (since you last completed this survey), how many times have you stopped smoking for 24 hours or longer because you were trying to quit?” Participants entered the number of times on a continuous scale. This variable was analyzed as categorical with “0” categorized as “no” and “≥1” categorized as “yes”. Ever quitting was assessed by the question “Have you ever stopped smoking cigarettes/using tobacco products for at least 24 hours because you were trying to quit?” Answer choices included “yes” or “no”.

Other Personal Characteristics

Sexual minorities are 1.5–2.5 times more likely to smoke cigarettes than their heterosexual counterparts.¹⁹ Thus, sexual identity was assessed using the following item:²⁰ “Do you consider yourself to be (mark only one):” choices were adapted as follows to include “transgender”; “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 LGBTQ (lesbian, gay, bisexual, transgender, questioning). The “Q” includes those answering “other” or “don’t know.” Sensation seeking was measured using an 8-item scale (BSSS-8).²¹ Respondents options were “strongly disagree” to “strongly agree” on a 5-point Likert scale. Higher scores indicate more sensation seeking. 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.). The variable was dichotomized into “no” and “any current use” of other substances. All of these variables were assessed at Time 1. Sensation seeking and other substance use may be of importance to assess the possibility of higher risk taking corresponding with menthol use.

Policy

It is important to include policy variables in the model because young adults and Blacks are less responsive to prices with respect to switching between menthol and non-menthol cigarettes than were older adults and non-Blacks, respectively.²² State tobacco control policy variables were used as control variables in the multivariable analysis to address macro level influences on smoking behavior. These variables include state smoking prevalence,^{23,24} total tax per cigarette pack (state + federal),²⁵ state-level per capita tobacco control expenditures rounded to the nearest cent (Huang, J. and Chaloupka, F.J., unpublished data, 2011) and level of state clean indoor air legislations measured in percentage of state population covered as of 2013²⁶ across all U.S. states and the District of Columbia. All policy variables were treated as continuous.

Data Analysis

Data analyses were performed using Stata IC 11.²⁷ The proportions remaining with each product type from initiation (collected retrospectively at baseline) to each of three time periods (collected every six months) were compared using a two-proportion *Z* test. Bivariate analyses were used to compare sociodemographic and cigarette-smoking characteristics across the four groups (remained menthol users, remained non-menthol users, switched from menthol to non-menthol, switched from non-menthol to menthol). Variables associated with current menthol use at Time 3 (at a *p* < .15 level)

were used in hierarchical multivariable logistic regression models in a sequential manner: sociodemographics, tobacco-use and other personal characteristics, menthol attitudes/beliefs, and policy indicators. Bivariate and multivariable analyses assessed the association between current menthol cigarette use and cessation intentions and behaviors at Time 3. Initiation with menthol cigarettes, age, gender, race/ethnicity, and self-described financial situation were retained as control variables in all multivariable models regardless of significance. At Wave 3, 88.2% of the baseline or Wave 2 sample was retained. The patterns of loss to follow-up on age, race, education, and past 30-day cigarette use in the full cohort mirror those in the (much smaller) analysis sample. In the broader sample, no difference in loss to follow-up was observed for current menthol use. However, in the analysis sample there is a difference in loss to follow-up on gender, with more females lost. While this study used a large (*n* = 3,092), probability sample of young adults, data were not weighted to be nationally-representative due to the small sample size of these analyses.

Results

Roughly two-thirds (*n* = 138) of the participants initiated smoking with non-menthol cigarettes and 35% (*n* = 74) initiated smoking with menthol cigarettes. Regarding patterns of switching between menthol and non-menthol cigarettes over the three survey waves, the greatest change was observed from Time 0 to Time 1 (Figure 1). By Time 1, 10.8% of participants initiating with menthol had switched to non-menthol, and 20.3% of participants starting with non-menthol had switched to menthol (1-tailed *Z* = 1.90, *p* = .031). Comparisons of each group over all three survey waves demonstrated no statistically significant difference in the probability of switching, indicating that the majority of switching occurs shortly after initiation. Those who initiated with menthol were less likely to switch than those initiating with non-menthol. No differences were found in age of initiation by menthol group (age at initiation = 14.8–15.6 years).

In the full sample of 267 young adults, 27% remained menthol smokers, 49% remained non-menthol smokers, 7% switched from menthol to non-menthol cigarettes, and 17% switched from non-menthol to menthol cigarettes (Table 1). Compared to those who remained non-menthol smokers, those who remained menthol smokers were more likely to be female (68.1% vs. 36.6%) and non-White (30.5% vs. 6.9%), less likely to report smoking mainly with others (4.8% vs. 12.8%), and more likely to report a higher score on the Allen menthol taste subscale (9.92 vs. 6.74). Compared to those who switched from menthol to non-menthol, those who switched from non-menthol to menthol were more likely to be non-White (20.0% vs. 5.3%), smoke mainly with others (27.5% vs. 14.3%), and score higher on the menthol taste subscale (10.64 vs. 9.00).

Table 2 presents predictors of current menthol cigarette use at Time 3. Model 1 showed that current menthol use was significantly increased among those who had initiated with a menthol product (*OR* = 11.98), were Black (*OR* = 15.31) or other race (*OR* = 3.36), and just met basic expenses compared to living comfortably (*OR* = 3.05). When sexual identity and self-identified smoking status were added to the model (Model 2), initiation with menthol, Black race, and “just meeting basic expenses” remained significant and Hispanic ethnicity became significant. When the menthol subscales were added (Model 3), initiation with menthol (*OR* = 8.50) and Black race (*OR* = 22.40) remained significant positive predictors, and score on the menthol taste subscale was positively associated

Figure 1. Use of menthol or non-menthol products over time among participants who remained smokers at all waves. *Information on product type used at initiation was collected retrospectively at baseline.

($OR = 1.55$) with current menthol cigarette use. Model 4 provided results that were similar to Model 3, though self-identification as a social or occasional smoker was negatively associated with current menthol use ($OR = 0.39$). None of the state-level policy indicators predicted current menthol cigarette use.

Associations between current menthol use and cessation intentions and behaviors were explored in Table 3. In bivariate analyses, current menthol cigarette users were twice as likely as non-menthol cigarette users to report intention to quit in longer than 6 months ($OR = 2.02$) or within 6 months ($OR = 2.01$) compared to “I don’t plan on quitting.” Current menthol users were also three times more likely than non-menthol users to report being very confident that they could quit when they wanted to ($OR = 3.04$) compared to not at all confident. Intention to quit and confidence did not translate to cessation behavior, however; current menthol and non-menthol cigarette users were equally likely to report having made a quit attempt (ever or in the past 6 months). Multivariable models for each cessation variable, controlling for initiation with menthol cigarettes and demographics, showed that the only significant association was between current menthol cigarette use and intention to quit. Current menthol cigarette users were more than twice as likely as non-menthol cigarette users to report that they planned to quit in longer than 6 months ($OR = 2.44$).

Discussion

This study demonstrates four main findings: first, most young adults in this study stay with the product that they originally started smoking with. Second, there is a greater degree of switching from non-menthol to menthol cigarettes than vice versa. Third, Black race and using menthol at time of first cigarette use strongly predict later menthol use in young adults. Fourth, young menthol smokers were interested in quitting, but were less interested in immediate (next 30-day) action than non-menthol smokers.

The current study found higher rates of switching from non-menthol to menthol cigarettes among young adults than from menthol to non-menthol cigarettes. This finding is consistent with the

longitudinal study of youth,¹⁰ but differs from two other studies: one study of 1,045 16–24 year old smokers²⁸ and another study of 5,932 U.S. adult smokers²⁹ that showed greater switching from menthol to non-menthol cigarettes than vice versa. The latter study also showed that switchers tended to revert to their earlier type, in line with findings of this study that young adults are likely to remain with the type of product they use first.²⁹ Another study has also shown a strong menthol brand loyalty in young adults;^{22,30} with participants less likely to see non-menthol cigarettes as substitutes for their menthol cigarettes. Given the magnitude of the effect of initiating with a menthol cigarette and smoking menthol cigarettes at one year follow-up, the current study’s results, along with other studies,^{11–13} are in line with the FDA’s Tobacco Product Scientific Advisory Committee’s conclusion that the availability of menthol cigarettes more likely than not increases experimentation and regular smoking.⁸ These studies consistently find that most users stick with their starter products (menthol or non-menthol) and the authors speculate that differences exist due to the comparison of established users versus youth who may not yet be established in their tobacco use.

In this study, Black race and using menthol at time of first cigarette use are the strongest predictors of later menthol use. Taste preference is the next most important predictor of menthol use, which remains significant in the final model. This finding is consistent with a previous study showing that preference for menthol taste correlates with menthol smoking among Black smokers versus smoking non-menthol or smoking both menthol and non-menthol cigarettes.¹⁸ Current menthol use was less likely among young adults identifying as social or occasional smokers compared to self-identified “smokers.” This finding may support menthol as a facilitator of experimentation to established cigarette use.^{31,32}

Menthol smokers in this study reported less urgency in their intention to quit but greater intention to quit smoking in the long-term than non-menthol cigarette users; however, these differences in intentions were not reflected in an increase in quit attempts among young adult menthol smokers. In concert with studies of increased nicotine dependence in young menthol smokers,^{3,8–10} decreased quit

Table 1. Sociodemographic, Tobacco Use, and Other Personal Characteristics by Pattern of Menthol Use (*n* = 267)^{a,b}

	Remained menthol (<i>n</i> = 72)		Remained non-menthol (<i>n</i> = 131)		Switched from menthol (<i>n</i> = 19)		Switched from non-menthol (<i>n</i> = 45)		<i>p</i> value
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	
Overall	72	27.0	131	49.1	19	7.1	45	16.9	–
Age									
18–24	31	43.1	42	32.1	10	52.6	20	44.4	.158
25–34	41	56.9	89	67.9	9	47.4	25	55.6	
Gender									
Male	23	31.9	83	63.4	11	57.9	28	62.2	<.001
Female	49	68.1	48	36.6	8	42.1	17	37.8	
Race/ethnicity									
White, non-Hispanic	36	50.0	105	80.2	14	73.7	26	57.8	<.001
Black, non-Hispanic	17	23.6	1	0.8	1	5.3	5	11.1	
Other, non-Hispanic	5	6.9	8	6.1	0	0.0	4	8.9	
Hispanic	14	19.4	17	13.0	4	21.1	10	22.2	
Education									
Less than high school	5	6.9	9	6.9	2	10.5	5	11.1	.368
High school	20	27.8	32	24.4	8	42.1	7	15.6	
Some college or greater	47	65.3	90	68.7	9	47.4	33	73.3	
Income to poverty ratio									
Less than 1	22	30.6	28	21.4	7	46.8	5	11.1	.044
Greater than 1	50	69.4	103	78.6	12	63.2	40	88.9	
Self-described financial situation									
Don't meet basic expenses	6	8.5	13	10.0	3	15.8	6	13.3	.444
Just meet basic expenses	27	38.0	44	33.9	6	31.6	22	48.9	
Meet needs with a little left	27	28.0	47	36.2	6	31.6	15	33.3	
Live comfortably	11	15.5	26	20.0	4	21.1	2	4.4	
Sexual identity									
Heterosexual	62	86.1	117	89.3	18	94.7	35	77.8	.170
LGBTQ	10	13.9	14	10.7	1	5.3	10	22.2	
Sensation-seeking (mean) ^c	24.47		24.82		25.26		26.11		.146
Other substance use, past 30 days									
No	18	25.0	34	26.0	3	15.8	7	15.6	.432
Yes	54	75.0	97	74.1	16	84.2	38	84.4	
Self-identified smoking status									
Smoker	45	62.5	61	46.9	8	42.1	23	51.1	.419
Social or occasional smoker	17	23.6	46	35.4	9	47.4	17	37.8	
Ex-smoker/tried smoking	9	12.5	20	15.4	1	5.3	4	8.9	
Non-smoker	1	1.4	3	2.3	1	5.3	1	2.2	
Social smoking behavior									
Smoke alone	17	27.4	18	17.7	1	7.1	3	7.5	.002
Smoke equally alone and with others	42	67.7	69	67.7	9	64.3	25	62.5	
Smoke mainly with others	3	4.8	13	12.8	2	14.3	11	27.5	
Smoke only with others	0	0.0	2	2.0	2	14.3	1	2.5	
Allen menthol scale ^c									
Medicinal (mean)	11.06		10.02		11.11		12.29		.058
Less harmful (mean)	6.36		5.98		6.58		6.87		.212
Taste (mean)	9.92		6.74		9.00		10.64		.041

Note. 3 missing on menthol status. LGBTQ = lesbian, gay, bisexual, transgender, questioning.

^aThe sample size of *N* = 267 was made up of the cohort of participants who completed the first three surveys and either remained current cigarette smokers across all three time points (*n* = 212) or initiated cigarette smoking at Time 2 and remained cigarette smokers at Time 3 (*n* = 58). Three participants were missing cigarette brand (menthol vs. non-menthol) at Time 3.

^bSociodemographic variables (not income), tobacco use characteristics and other personal characteristics were collected at Time 1; income and menthol attitudes and beliefs = Time 2; smoking cessation = Time 3; menthol use = all three time points.

^c*p* values generated from Fisher's exact tests.

success among young adult menthol smokers compared to non-menthol smokers,¹⁵ and a greater number of failed quit attempts among menthol compared to non-menthol smokers,^{15,32} despite greater confidence in the ability to quit among menthol smokers compared to non-menthol smokers³³ findings from this study raise concerns about

the impact of menthol cigarette use on cessation. In addition, the Tobacco Products Scientific Advisory Committee report concludes that the availability of menthol cigarettes results in a lower likelihood of smoking cessation among Blacks compared to smoking non-menthol cigarettes.³

Table 2. Logistic Regression of Current Menthol Cigarette Use at Time 3 Among Those Who Remained Smokers at All Three Time Points or Those Who Initiated at Time 2 and Remained Smokers at Time 3, Unadjusted and Adjusted ($n = 267$)^a

	Crude OR 95% CI		Model 1		Model 2		Model 3	
			Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
Initiated with menthol cigarettes								
No	ref							
Yes	13.57	7.29–25.24	11.98	6.03–23.8	12.33	6.12–24.84	8.50	3.93–18.39
Age								
18–24	1.53	0.93–2.53^b	1.21	0.64–2.29	1.16	0.60–2.23	1.02	0.49–2.13
25–34	ref							
Gender								
Male	ref							
Female	2.37	1.44–3.91	1.47	0.77–2.77	1.30	0.68–2.49	1.63	0.77–3.44
Race/ethnicity								
White, non-Hispanic	ref							
Black, non-Hispanic	24.55	5.58–108.02	15.31	2.99–78.16	18.89	3.49–102.34	22.40	3.88–129.44
Other, non-Hispanic	2.51	0.92–6.85^b	3.36	1.05–10.79	2.31	0.68–7.87	1.91	0.52–7.07
Hispanic	2.33	1.20–4.53	2.25	0.99–5.11	2.36	1.01–5.55	2.21	0.83–5.91
Education								
Less than high school	1.02	0.41–2.53						
High school	0.81	0.45–1.44						
Some college or greater	ref							
Income to poverty ratio (>1.0)	0.96	0.54–1.71						
Self-described financial situation								
Don't meet basic expenses	1.73	0.64–4.67	2.38	0.70–8.13	2.11	0.60–7.47	2.21	0.55–8.90
Just meet basic expenses	2.00	0.94–4.29^b	3.05	1.16–8.03	2.95	1.09–7.98	2.34	0.78–7.03
Meet needs with a little left	1.54	0.71–3.32	1.77	0.66–4.74	1.64	0.60–4.52	1.90	0.62–5.86
Live comfortably	ref							
Sexual identity								
Heterosexual	ref							
LGBTQ	2.10	1.02–4.32			2.39	0.97–5.90	1.89	0.69–5.18
Sensation-seeking (mean)	1.00	0.005						
Other substance use, past 30 days								
No	ref	0.64–2.05^b						
Yes	1.14							
Self-identified smoking status								
Smoker	ref							
Social or occasional smoker	0.66	0.38–1.14^b			0.52	0.24–1.13	0.44	0.18–1.06
Ex-smoker/tried smoking	0.73	0.34–1.57			1.06	0.40–2.78	1.32	0.45–3.88
Non-smoker	0.59	0.10–3.31			0.44	0.03–6.62	0.19	0.01–3.57
Social smoking behavior								
Smoke alone	ref							
Smoke equally alone and with others	0.71	0.35–1.44						
Smoke mainly with others	0.67	0.25–1.77						
Smoke only with others	0.24	0.02–2.32						
Allen menthol scale								
Medicinal (mean)	1.10	1.03–1.17					0.99	0.86–1.15
Less harmful (mean)	1.09	0.99–1.19^b					0.90	0.74–1.11
Taste (mean)	1.48	1.33–1.64					1.55	1.31–1.82
State-level variables								
Smoking prevalence	0.96	0.89–1.05						
Total tax (state + federal)	1.04	0.82–1.32						
Tobacco control funding	0.96	0.99–1.01						
100% coverage of clean indoor air laws	1.00	0.22–0.97						

Note. LGBTQ = lesbian, gay, bisexual, transgender, questioning; OR = odds ratio. Sociodemographic variables (not income), tobacco use characteristics and other personal characteristics were collected at Time 1; income and menthol attitudes and beliefs = Time 2; smoking cessation = Time 3; menthol use = all three time points; policy was a control variable.

^aThe sample size of $N = 267$ was made up of the cohort of participants who completed the first three surveys and either remained current cigarette smokers across all three time points ($n = 212$) or initiated cigarette smoking at Time 2 and remained cigarette smokers at Time 3 ($n = 58$). Three participants were missing cigarette brand (menthol vs. non-menthol) at Time 3; $p < .05$.

^bAssociated p value is less than .10.

Table 3. Logistic Regression of Current Menthol Cigarette Use on Cessation Behaviors at Time 3 Among Those Who Remained Smokers at All Three Time Points or Those Who Initiated at Time 2 and Remained Smokers at Time 3, Unadjusted and Adjusted ($n = 267$)^{a,b}

	Crude OR	95% CI	Adjusted OR ^c	95% CI
Intention to quit				
I don't plan on quitting	ref		ref	
Longer than 6 months	2.02	1.08–3.79	2.44	1.08–5.52
Within the next 6 months	2.01	1.03–3.92	1.89	0.78–4.61
Within the next 30 days	0.87	0.28–2.70	0.86	0.21–3.48
Confidence to quit				
Very confident	3.04	1.01–9.13	1.49	0.38–5.77
Fairly confident	2.46	0.84–7.20	1.93	0.54–6.98
Not very confident	2.23	0.72–6.90	1.83	0.47–7.06
Not at all confident	ref		ref	
Ever quit attempt				
No	ref		ref	
Yes	1.15	0.69–1.91	0.84	0.43–1.63
Quit attempt in past 6 months				
No	ref		ref	
Yes	0.69	0.40–1.19	0.62	0.30–1.27

Note. OR = odds ratio.

^aThe sample size of $N = 267$ was made up of the cohort of participants who completed the first three surveys and either remained current cigarette smokers across all three time points ($n = 212$) or initiated cigarette smoking at Time 2 and remained cigarette smokers at Time 3 ($n = 58$). Three participants were missing cigarette brand (menthol vs. non-menthol) at Time 3.

^bAll smoking cessation variables were collected at Time 3.

^cAdjusted OR controls for initiation with menthol cigarettes, age, gender, race/ethnicity, and self-described financial situation, but not for other cessation variables.

The following limitations are present. First, smoking and cessation behaviors were not biochemically verified and although self-report information was collected on product initiation, this study assumed that menthol product use between initiation and Time 1 was consistent, though there may have been uncaptured brand switching during this period. This assumption also applies to the quit attempt window. Second, participants were only followed for 1 year, so longer-term patterns of menthol smoking could not be assessed. Third, the group that switched to non-menthol was small and so the estimates of this group may not be valid. Finally, neither frequency of use nor dependence was analyzed in this study which may have important effects on menthol use patterns.

Few studies have examined longitudinal patterns of menthol cigarette use in a sample of young adult smokers. These data add to the current literature to suggest that there is little switching from the menthol/non-menthol choice following initiation and that menthol initiation is highly predictive of later menthol smoking. No differences in age of tobacco use initiation were present between groups. This eliminates the possibility of bias based on age of initiation or progression to daily use.³⁴ Menthol smokers were interested in quitting, but were less interested in immediate (next 30-day) action than non-menthol smokers. The authors recommend that future studies measure brand used in addition to first product used to better understand trajectories of use. Additional data on the role of menthol in cigarettes on smoking uptake and maintenance is needed to inform proposed policymaking at the local, state, and national levels.

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Declaration of Interests

None declared.

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