Original investigation

Are Young People's Beliefs About Menthol Cigarettes Associated With Smoking-Related Intentions and Behaviors?

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Abstract

Introduction: Little is known about the beliefs that youth and young adults hold about menthol cigarettes or the influence of these beliefs on tobacco use initiation.

Methods: Online cross-sectional surveys with 13- to 17-year-old current nonsmokers ($n = 553$) and 18- to 25-year-old never ($n = 586$) and current tobacco users ($n = 307$) in the United States assessed the association between endorsing each of 9 pro-menthol beliefs and (a) intentions to smoke menthol cigarettes over the next year, (b) current use of menthol cigarettes, (c) intentions to use tobacco in general over the next year, and (d) current use of tobacco products in general.

Results: Menthols were perceived to be less harmful and addictive than nonmenthol cigarettes by between 13% and 23% of respondents. Between 20% and 58% believed that menthols had favorable sensory properties, and 7%–25% believed that menthol smokers were more popular and attractive than nonmenthol smokers. Logistic regression analyses (adjusting for confounders) indicated that, on the whole, those who endorsed pro-menthol beliefs were more likely to intend to use, and to currently use, both menthols and tobacco products in general. For example, respondents who believed that menthol cigarettes were more refreshing in sensation (one of the most frequently endorsed beliefs) were significantly more likely to (a) intend to smoke menthol cigarettes (13- to 17-year-olds, odds ratio [OR] = 2.12, 95% confidence interval [CI] = 1.03, 4.34; 18- to 25-year olds, OR = 2.62, 95% CI = 1.04, 6.60), (b) currently use menthol cigarettes (18- to 25-year olds, OR = 3.40, 95% CI = 2.20, 5.26), (c) intend to use tobacco (13- to 17-year-olds OR = 1.74, 95% CI = 1.14, 2.65), and (d) currently use tobacco (18- to 25-year olds, OR = 2.06, 95% CI = 1.44, 2.93).

Conclusions: Youth and young adults who do not currently smoke and who hold favorable beliefs about menthol cigarettes are at greater risk for beginning to use tobacco products, indicating that the availability of menthol cigarettes may contribute to tobacco use initiation. These findings support recent claims that the elimination of menthol cigarettes would improve public health in the United States.

Introduction

Every day, around 4,000 adolescents in the United States smoke their first cigarette,¹ and there is evidence that the availability of menthol cigarettes may facilitate smoking initiation.^{2,3} Use of menthol cigarettes is particularly common among youth and young adult smokers: analyzing data from the 2008–2010 National Surveys on Drug Use and Health (NSDUH), Giovino *et al.*² found that 57% of 12–17 year olds in the United States who had smoked in the past 30 days had smoked menthol cigarettes (in the past 30 days). Similarly, 45% of 18- to 25-year-old past 30-day smokers had smoked menthol cigarettes, compared with around one third of those aged 26 years and older.² Of additional concern is that the proportion who smoked menthol cigarettes in the past 30 days remained stable among youth and increased among young adults between 2004 and 2010, even as the prevalence of non-menthol cigarette use declined.² Given that young menthol smokers tend to be more addicted⁴ and more likely to become established smokers,⁵ these findings are troubling.

The Family Smoking Prevention and Tobacco Control Act of 2009⁶ granted the U.S. Food and Drug Administration (FDA) regulatory authority over tobacco. The Tobacco Control Act also prohibited fruit- and candy-like flavors in cigarettes, in recognition of the role that these flavors play in smoking initiation. However, menthol was excepted from this ban. Instead, the Act directed the FDA's Tobacco Products Scientific Advisory Committee (TPSAC) to review the scientific evidence on the public health impact of menthol cigarettes. Submitted in July 2011, the TPSAC review concluded that the availability of menthol cigarettes likely increased smoking experimentation and progression to regular smoking, and that the “removal of menthol cigarettes from the marketplace would benefit public health in the United States”.³ Despite this recommendation, the FDA has not yet taken action to regulate menthol in cigarettes.

There is evidence that the tobacco industry has actively targeted youth and young adults as menthol cigarette consumers,³ by formulating the product to have maximum appeal to young people^{7,8} and by targeting youth in their promotion of menthol cigarettes. Advertisements for menthols have traditionally promoted images of youthfulness and fun^{9,10} and have featured younger looking models than those used in advertisements for nonmenthol cigarettes.^{11,12} Adolescents are particularly receptive to tobacco advertisements, and longitudinal studies have demonstrated that advertising receptivity is associated with an increased likelihood of smoking initiation and progression.^{13,14} In addition, cigarette packaging is known to play an influential role in communicating brand imagery,¹⁵ in shaping young people's perceptions of the product and users of the product,^{16–19} and in contributing to beliefs that some cigarette brands and variants are less harmful than others.²⁰ Menthol cigarettes are most commonly sold in green packages. While mostly used to identify a product as being mentholated,^{15,21} the color green may also elicit positive associations of coolness, nature, health, and harmony (Fraser and Banks,²² as cited in National Cancer Institute²³).

Little is known about the beliefs that youth and young adults hold about menthol cigarettes and the ways in which these beliefs may or may not influence patterns of tobacco use. Studies with adults have demonstrated that menthol users hold favorable perceptions of menthol cigarettes that are consistent with the characteristics highlighted in marketing materials.^{24–27} Although some experimental studies examining the effects of plain versus branded packaging among young people have indicated that menthol cigarettes are among the most favorably rated on measures of perceived taste,^{16,18,28,29} a recent review did not locate any studies that had specifically examined youth perceptions of menthol cigarettes or the effects of these beliefs on intentions and

behaviors.²⁷ In this study, we addressed this gap in the literature by measuring knowledge of and beliefs about menthol cigarettes among youth and young adults. We also assessed the extent to which these beliefs are associated with (a) intentions to use menthol cigarettes, (b) the likelihood of being a current (vs. never) menthol cigarette smoker, (c) intentions to use tobacco in general, and (d) the likelihood of being a current (vs. never) tobacco user. These findings have the potential to impact FDA decision making about the regulation of menthol cigarettes, given that the FDA is required to assess the potential impact of proposed actions on both current user behavior and the likelihood that nonusers will begin smoking menthol cigarettes.⁶

Methods

Procedure

Data were collected as part of a larger online cross-sectional survey that measured smoking-related beliefs, intentions, and behaviors among youth (13- to 17-year-olds) and young adults (18- to 25-year-olds). The total survey took respondents around 12 min to complete. Respondents who completed the survey in less than half the median time or who took more than one hour to complete it, or who had missing data on more than 10% of the variables, were excluded from the analytic samples. This data cleaning procedure excluded 6% of the recruited 13- to 17-year-olds and 8% of the recruited 18- to 25-year-olds. The Institutional Review Board at the University of Pennsylvania approved this study.

Sample

13- to 17-Year-Old Participants

Data were collected between September and November 2012 from two sources: Survey Sampling International (SSI; <http://www.survey-sampling.com/>) and GfK's KnowledgePanel® (<http://www.gfk.com/us/Solutions/consumer-panels/Pages/GfK-KnowledgePanel.aspx>). SSI's opt-in online panel comprises individuals aged 18 years and older, and so the 13- to 17-year-old participants were recruited through an adult panel member (valid data from $n = 805$). GfK maintains both a teen (13–17 years) and adult panel (18+ years), and for this study, individuals were recruited from both (valid data from $n = 388$). Regardless of which panel respondents came from, an adult provided permission for teen participation. Respondents from the SSI and GfK samples were combined into a composite sample, which was then weighted to be representative of the U.S. population of 13- to 17-year-olds in terms of sex, age, race/ethnicity, and the proportion living in metropolitan areas. GfK provided representative weights with their data; therefore, marginal proportions from the weighted GfK sample were used as the benchmark for weighting the combined sample.

18- to 25-Year-Old Participants

In April 2013, we surveyed 18- to 25-year-old participants (valid data from $n = 3,031$) recruited through SSI. Quotas were used to recruit never-smokers, former smokers, not daily smokers, and daily smokers in proportion to their numbers in the 2010 NSDUH.³⁰ Weights were applied so that the sample matched the NSDUH distributions of sex, age, race/ethnicity, education, and metropolitan living status for 18- to 25-year olds within each smoking behavior subgroup.³¹

Measures

Awareness and Beliefs About Menthol Cigarettes

We first asked respondents if they had ever heard of menthol cigarettes. Among those who had heard of menthols, we then measured

seven beliefs about the relative characteristics of menthol and nonmenthol cigarettes, and two beliefs about menthol and nonmenthol smokers. For each question, respondents selected one of five statements. For example, for the question “How addictive are menthol cigarettes compared to nonmenthol cigarettes?”, the response options were the following: menthol cigarettes are a lot more addictive; menthol cigarettes are more addictive; menthol and nonmenthol cigarettes are equally addictive; menthol cigarettes are less addictive; and menthol cigarettes are a lot less addictive. We then combined the first three response options into a category representing a negative or neutral belief about menthols (the “anti-menthol belief”) and the last two responses into a category representing a favorable belief about menthols (the “pro-menthol belief”).

Intentions to Use Tobacco and to Smoke Menthol Cigarettes

Intentions to use tobacco over the next year were measured using between three and five sequential questions (depending on skip patterns), and intentions to smoke menthol cigarettes over the next year were measured using between one and three questions. All questions were measured using 5-point scales (very unlikely; unlikely; neither likely nor unlikely; likely; very likely). Respondents were categorized as having no intention to use tobacco *only* if they responded *very unlikely* to all five of the tobacco behavioral intention questions. Four of these questions specifically asked about their intended behavioral status 1 year from now: smoking every day; smoking, but not every day; smoking any form of tobacco products other than cigarettes (e.g., cigars, water pipes, little cigars, and pipes); and using some form of smokeless tobacco (e.g., chewing tobacco, snuff, and dip). The fifth question asked about their intended behavior over the next year: smoke even one or two puffs of a cigarette. Among those who had heard of menthol cigarettes, respondents were categorized as having no intention to smoke menthol cigarettes *only* if they responded *very unlikely* to all three menthol behavioral intention questions (however, note that they were only asked each menthol intention question if they had previously indicated that they intended to perform the corresponding tobacco use behavior). Two of the questions asked respondents about their intended behavioral status 1 year from now: smoking menthol cigarettes every day and smoking menthol cigarettes, but not every day. The third question asked about their intended behavior over the next year: smoke even one or two puffs of a menthol cigarette.

Current Use of Tobacco and Menthol Cigarettes

Four tobacco use status groups were relevant both for defining the analytic samples and for creating the outcome measures used in the current analyses: current nonsmokers (13- to 17-year-olds); never tobacco users (18- to 25-year-olds); current tobacco users (18- to 25-year-olds); and current menthol cigarette smokers (18- to 25-year-olds). Current nonsmokers (13- to 17-year-olds) were identified using a measure of intentions to smoke in the next 30 days. We had to rely on this measure of intentions to smoke in the next 30 days as a proxy measure of actual smoking behavior because SSI would not permit us to measure actual smoking behavior among their 13- to 17-year-old respondents (due to legal concerns). However, we were able to measure smoking behavior in the GfK sample of 13- to 17-year-olds, which allowed us to determine how much risk there was of misclassification (labeling actual smokers as nonsmokers) when using 30-day intentions to categorize 13- to 17-year-olds as current nonsmokers. In the GfK sample, of those who did not intend to smoke in the next 30 days, only 2.6% reported that they had used

some tobacco in the past 30 days. Or viewed from a complementary perspective, we assume that about 97% of those classified as nonsmokers by the 30-day intention measure would have also been classified as nonsmokers if we had a direct measure.

We identified 18- to 25-year-old never tobacco users using three questions: (1) “Have you ever tried cigarette smoking, even one or two puffs?” (Yes; No); (2) “During the past 30 days, did you smoke any form of tobacco products other than cigarettes (e.g., cigars, water pipe, cigarillos, little cigars, and pipes)?” (Yes; No); and (3) “During the past 30 days, did you use any form of smokeless tobacco products (e.g., chewing tobacco, snuff, and dip)?” (Yes; No). Those who responded “No” to all three questions were categorized as never tobacco users. However, a limitation of this measure is that some of these respondents may have had experience using smokeless or smoked (other than cigarettes) tobacco products prior to 1 month ago.

Current tobacco users were identified using four questions: (1a) “Have you ever tried cigarette smoking, even one or two puffs?” (Yes; No) and (1b) “When was the last time you smoked a cigarette, even one or two puffs?” (measured using a 7-point scale collapsed into: during the past 30 days; not during the past 30 days); (2) “During the past 30 days, did you smoke any form of tobacco products other than cigarettes (e.g., cigars, water pipe, cigarillos, little cigars, and pipes)?” (Yes; No); and (3) “During the past 30 days, did you use any form of smokeless tobacco products (e.g., chewing tobacco, snuff, and dip)?” (Yes; No). Those who responded that they had used any form of tobacco in the past 30 days were categorized as current tobacco users. One additional question was then used to limit the sample to those who initiated cigarette smoking after the age of 18 years: “How old were you when you first tried a cigarette?” Restricting the sample in this way increased comparability of the two groups used in the behavior analyses (see Table 1), namely 18- to 25-year-old never tobacco users, who by definition, will have to initiate after the age of 18, and current tobacco users who initiated cigarette smoking at age 18 years or older. Current menthol cigarette smokers were the subset of current tobacco users who reported that they had smoked menthol cigarettes during the past 30 days.

Covariates

Respondents reported their sex, age, race/ethnicity, and highest level of education achieved and whether they had any siblings who smoked, lived with a tobacco user, and had any close friends who used tobacco. Zip codes were used to classify respondents as living in metropolitan or nonmetropolitan areas, and a 4-item scale measured sensation seeking (adapted from Hoyle, Stephenson, Palmgreen, Lorch, & Donohew³²).

Data Analysis

We first examined the proportion of respondents who reported awareness of menthol cigarettes and endorsed each of the nine pro-menthol beliefs. Through running a series of logistic regression models (unadjusted and adjusted for covariates), we then examined the association between endorsing each belief and: (a) intentions to smoke menthol cigarettes over the next year (menthol intention analysis; separate models for 13- to 17-year-olds and 18- to 25-year-olds); (b) being a current menthol cigarette smoker versus never tobacco user (menthol behavior analysis; 18- to 25-year-olds only); (c) intentions to use tobacco over the next year (tobacco intention analysis; separate models for 13- to 17-year-olds and 18- to 25-year-olds);

Table 1. Definition and Size of the Analytic Sample Used in Each Intention and Behavior Analysis

Analysis	Analytic sample	Definition of analytic sample
13- to 17-year-olds		
Menthol intention	$n = 553$ current nonsmokers ^a	<i>Current nonsmoker</i> : no intention to smoke in next 30 days ^a ($n = 1,133$) and heard of menthol cigarettes ($n = 553$)
Tobacco intention	As above	As above
18- to 25-year-olds		
Menthol intention	$n = 586$ never tobacco users	<i>Never tobacco user</i> : never even tried a puff of a cigarette and had not used any other form of tobacco in past 30 days ($n = 1,030$) and heard of menthol cigarettes ($n = 586$)
Menthol behavior	$n = 751$ never tobacco users and current menthol cigarette smokers	<i>Never tobacco user</i> : never even tried a puff of a cigarette and had not used any other form of tobacco in past 30 days ($n = 1,049$) and heard of menthol cigarettes ($n = 586$) AND <i>Current menthol cigarette smoker</i> : used some tobacco in the past 30 days (smoked cigarettes or used some other form of smoked or smokeless tobacco) and 18 years or older when they first tried a cigarette ^b and smoked menthol cigarettes in past 30 days ($n = 165$)
Tobacco intention	$n = 585$ never tobacco users	<i>Never tobacco user</i> : never even tried a puff of a cigarette and had not used any other form of tobacco in past 30 days ($n = 1,047$) and heard of menthol cigarettes ($n = 585$)
Tobacco behavior	$n = 893$ never tobacco users and current tobacco users	<i>Never tobacco user</i> : never even tried a puff of a cigarette and had not used any other form of tobacco in past 30 days ($n = 1,049$) and heard of menthol cigarettes ($n = 586$) AND <i>Current tobacco user</i> : used some tobacco in the past 30 days (smoked cigarettes or used some other form of smoked or smokeless tobacco) and 18 years or older when they first tried a cigarette ^b ($n = 337$) and heard of menthol cigarettes ($n = 307$)

All reported sample sizes are limited to those participants who had nonmissing data on all of the demographic variables and on the outcome variable of interest, which accounts for differences in the number of never tobacco users available across analyses (i.e., one never tobacco user who had heard of menthol cigarettes had missing data on the tobacco intention measure).

^aGiven legal concerns, Survey Sampling International (SSI) would not permit us to ask directly about youth smoking behavior. We therefore used a measure of whether the respondent intended to smoke in the next 30 days as a surrogate measure of smoking status. However, using the GfK sample—where we were permitted to ask about both intentions and behavior—we found that only 2.6% of those who did not intend to smoke in the next 30 days reported that they had used some tobacco in the past 30 days, suggesting that about 97% of those who were classified as nonsmokers by the 30-day intention measure would have been classified as nonsmokers if we had a direct measure.

^bWe excluded those who had initiated cigarette smoking before 18 years of age to increase the comparability of the two groups used in the behavior analysis (the never tobacco users, by definition, would have to initiate tobacco use after 18 years of age) and to reduce the degree to which beliefs about menthol cigarettes may have been affected by prior use.

and (d) being a current versus never tobacco user (tobacco behavior analysis; 18- to 25-year-olds only). As appropriate for the different outcome measures, the sample size and definition varied across these four sets of analyses, as demonstrated in Table 1.

Analyses that use cross-sectional data to examine belief–intention and belief–behavior associations each have certain strengths and limitations. Intention analyses look at the right people: they examine the effect of belief endorsement on intentions among those who do not currently use the products and therefore have the benefit of ruling out the possibility of reverse causation (as one's beliefs could not have been impacted by one's smoking behavior). However, this analysis has some risk of error, as intentions do not always turn into action. Behavior analyses make use of a harder outcome, but the behavior being assessed (current versus never smoking) occurred before the measurement of beliefs, and so we cannot be sure that the measured beliefs were held before the smoking began. That is, inference of a causal relationship between beliefs and behaviors is problematic in these analyses. In an effort to address the limitations associated with each type of analysis, we conducted both and looked for similarities in findings when drawing conclusions. All analyses

were conducted in Stata 13.0, adjusting for the effects of sample weighting on parameter estimates and standard errors.

Results

Within the sample of 13- to 17-year-old current nonsmokers, 49% reported that they had heard of menthol cigarettes. Of the 18- to 25-year-old never tobacco users, 56% had heard of menthols, and of the 18- to 25-year-old current tobacco users, 91% had heard of menthol cigarettes. All subsequent analyses were restricted to those who had heard of menthol cigarettes, and the demographic characteristics of these analytic samples are presented in Table 2.

We measured three beliefs related to the health effects and addictiveness of menthol cigarettes (harmful to your body; addictive; and nicotine) and found that the level of endorsement of these beliefs ranged from 12.7% to 22.9% (Table 3). Four beliefs that compared the sensory properties of menthol and nonmenthol cigarettes (refreshing in taste; refreshing in sensation; easy to smoke; and soothing for a sore throat) were endorsed by between 20% and

Table 2. Sample Characteristics

	13- to 17-year-old current nonsmokers (<i>n</i> = 553)	18- to 25-year-old never tobacco users (<i>n</i> = 586)	18- to 25-year-old current tobacco users ^a (<i>n</i> = 307)	18- to 25-year-old current menthol cigarette smokers ^a (<i>n</i> = 165)
	Unweighted % (weighted %)	Unweighted % (weighted %)	Unweighted % (weighted %)	Unweighted % (weighted %)
Female	59 (51)	62 (62)	47 (45)	50 (47)
Education				
High school or less	96 (97)	28 (44)	33 (51)	35 (52)
Some college education	3 (3)	41 (34)	42 (31)	37 (28)
Associate degree or more	1 (0)	31 (22)	25 (19)	28 (20)
Race/ethnicity				
Non-Hispanic White	53 (57)	62 (56)	55 (55)	56 (57)
Non-Hispanic Black	13 (15)	11 (17)	13 (16)	16 (18)
Hispanic	19 (20)	12 (18)	18 (20)	16 (18)
Other	15 (7)	15 (9)	14 (9)	12 (7)
Lives in a metropolitan area	84 (83)	85 (85)	89 (87)	90 (91)
Sibling smokes	21 (21)	20 (21)	37 (38)	49 (52)
Lives with a tobacco user	42 (43)	30 (33)	53 (52)	56 (55)
Any close friend uses tobacco	33 (31)	40 (42)	85 (83)	87 (84)
	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>
Age	15.6 ± 1.3 (15.3 ± 1.4)	21.6 ± 2.3 (21.2 ± 2.3)	22.1 ± 2.1 (22.0 ± 2.1)	22.4 ± 2.1 (22.3 ± 2.1)
Sensation seeking (1–5)	3.0 ± 1.0 (3.0 ± 1.0)	3.1 ± 0.9 (3.1 ± 0.9)	3.4 ± 0.9 (3.3 ± 0.9)	3.4 ± 0.8 (3.4 ± 0.9)

All reported sample sizes are limited to participants who had heard of menthol cigarettes and had nonmissing data on all of the demographic variables, and are for the weighted samples (however, note that only 585 of the never tobacco users were available for the tobacco intention analysis due to missing data on the tobacco intention outcome measure). The total sample of 13- to 17-year-olds was weighted by sex, age, race/ethnicity, and the proportion living in metropolitan areas. The total sample of 18- to 25-year-olds was weighted by these same characteristics, as well as education.

^a18- to 25-year-old current tobacco users and menthol cigarette smokers are limited to those who initiated smoking cigarettes at 18 years or older.

Table 3. Proportion of 13- to 17-Year-Old Current Nonsmokers and 18- to 25-Year-Old Never Tobacco Users, Current Tobacco Users, and Current Menthol Cigarette Smokers Who Endorse Pro-menthol Beliefs

	13- to 17-year-old current nonsmokers (<i>n</i> = 553)	18- to 25-year-old never tobacco users (<i>n</i> = 586)	18- to 25-year-old current tobacco users ^a (<i>n</i> = 307)	18- to 25-year-old current menthol cigarette smokers ^a (<i>n</i> = 165)
Menthol cigarettes are [contain] less:				
Harmful to your body	14.8	18.2	14.2	14.4
Addictive	12.7	14.9	14.5	13.4
Nicotine	17.7	22.9	18.3	14.9
Menthol cigarettes are more:				
Refreshing in taste	30.5	31.0	47.4	57.7
Refreshing in sensation	32.7	27.3	47.4	57.0
Easy to smoke	20.8	19.9	28.7	38.2
Soothing for a sore throat	28.7	24.6	43.8	46.4
Menthol smokers are more:				
Popular	12.5	9.7	15.6	25.2
Attractive	8.0	6.7	10.2	15.0

All reported sample sizes are limited to participants who had heard of menthol cigarettes and had nonmissing data on all of the demographic variables and are for the weighted samples (however, note that only 585 of the never tobacco users were available for the tobacco intention analysis due to missing data on the tobacco intention outcome measure). All analyses are also restricted to participants who had nonmissing data on the belief variable; missing data (due to participant non-response) for each belief variable ranged between *n* = 0 and *n* = 14.

^a18- to 25-year-old current tobacco users and menthol cigarette smokers are limited to those who initiated smoking cigarettes at 18 years or older.

58% of respondents, with particularly high levels of endorsement among the 18- to 25-year-old current menthol cigarette smokers and current tobacco users. Finally, two beliefs measured perceptions of the characteristics of menthol versus nonmenthol smokers (popular and attractive). These beliefs were endorsed by between 6.7% and 25.2% (Table 3).

Table 4 presents results from the menthol intention and behavior analyses. Among 13- to 17-year-old current nonsmokers who had

heard of menthol cigarettes, only 6% had some intention to smoke menthol cigarettes, and only 4% of 18- to 25-year-old never tobacco users had some intention to smoke menthols. Current smokers of menthol cigarettes comprised 22% of the sample used for the menthol behavior analysis (18- to 25-year-olds; see Table 1). For 13- to 17-year-olds two of the nine pro-menthol beliefs were positively associated with intentions to smoke menthol cigarettes: youth who endorsed these beliefs were between 2.1 and 3.7 times more likely to

Table 4. Association Between Endorsing Pro-menthol Beliefs and Intending to Smoke Menthol Cigarettes Over the Next Year (Menthol Intention Analysis) or Currently Smoking Menthol Cigarettes (Menthol Behavior Analysis)

	Menthol intention analysis; 13- to 17-year-old current nonsmokers (<i>n</i> = 553)		Menthol intention analysis; 18- to 25-year-old never tobacco users (<i>n</i> = 585)		Menthol behavior analysis; 18- to 25-year-old never tobacco users and current menthol smokers (<i>n</i> = 751)	
	% Intending	Adj. OR (95% CI)	% Intending	Adj. OR (95% CI)	% Menthol smokers	Adj. OR (95% CI)
Total	6.0		3.9		21.9	
Harmful to your body ^a	6.0		3.0		22.7	
Anti-menthol						
Pro-menthol		0.82 (0.32–2.10)		2.58 [^] (0.95–6.98)	18.2	0.83 (0.44–1.57)
Addictive ^a	6.6		7.8		22.2	
Anti-menthol	6.0		3.4		22.2	
Pro-menthol	7.0	0.89 (0.33–2.39)	7.0	2.20 (0.79–6.10)	20.2	0.87 (0.44–1.73)
Nicotine ^a	6.0		2.9		23.7	
Anti-menthol	6.4	0.92 (0.37–2.30)	7.5	2.43 (0.79–7.47)	15.5	0.58 [^] (0.31–1.10)
Pro-menthol	5.4		3.2		14.7	
Refreshing in taste ^b	7.6	1.26 (0.62–2.57)	5.6	1.86 (0.75–4.62)	34.3	2.71 ^{**} (1.73–4.25)
Anti-menthol	4.4		2.7		14.2	
Pro-menthol	9.8	2.12 [*] (1.03–4.34)	7.1	2.62 [*] (1.04–6.60)	36.9	3.40 ^{**} (2.20–5.26)
Refreshing in sensation ^b	4.9		2.6		17.9	
Anti-menthol	10.7	2.14 [^] (1.00–4.57)	9.3	3.79 ^{**} (1.48–9.73)	35.1	2.16 ^{**} (1.37–3.41)
Pro-menthol	5.3		3.1		16.6	
Soothing for a sore throat ^b	8.3	1.40 (0.65–3.00)	6.6	2.38 (0.76–7.48)	34.7	2.50 ^{**} (1.60–3.93)
Popular ^c	4.7		3.3		18.9	
Anti-menthol	16.3	3.70 ^{**} (1.54–8.91)	9.6	2.71 [^] (0.83–8.81)	42.2	2.35 ^{**} (1.29–4.29)
Pro-menthol	5.6		3.6		20.4	
Attractive ^c	13.2	2.07 (0.79–5.43)	8.8	3.33 [*] (1.06–10.47)	38.4	1.94 [*] (1.08–3.46)

In all models, the anti-menthol belief is the reference category. All models adjust for gender, age, race/ethnicity, sensation seeking, living in a metropolitan area, sibling smoking, living with a tobacco user, and having at least one close friend who uses tobacco. Additionally, the two 18- to 25-year-old models adjust for education. Models that did not adjust for these covariates showed the same pattern of results, albeit with a tendency toward stronger levels of statistical significance. All analyses are restricted to participants who had heard of menthol cigarettes and who had nonmissing data on the belief variables; missing data (due to participant nonresponse) for each belief variable ranged between *n* = 0 and *n* = 14. All analyses use weighted data and significance tests adjust for complex sample design. Adj. = adjusted for covariates listed above; OR = odds ratio; CI = confidence interval.

^aPro-menthol beliefs combine the two responses indicating that “menthol cigarettes are [contain] less”

^bPro-menthol beliefs combine the two responses indicating that “menthol cigarettes are more”

^cPro-menthol beliefs combine the two responses indicating that “menthol smokers are more”

***p* < .01; ^{*}*p* < .05; [^]*p* < .10.

intend to smoke menthols. Three of nine beliefs were associated with intentions among 18- to 25-year olds, increasing the likelihood that these young adults intended to smoke menthol cigarettes by 2.6 to 3.8 times. Six of the nine beliefs (including the three that were associated with intentions) were associated with current use of menthol cigarettes among 18- to 25-year olds, such that respondents who endorsed these beliefs were up to 3.4 times more likely to be a current menthol smoker than a never tobacco user.

Table 5 presents results from the tobacco intention and behavior analyses. Among 13- to 17-year-old current nonsmokers, 32% had some intention to use tobacco over the next year, and 24% of 18- to 25-year-old never tobacco users had some intention to use tobacco. Current tobacco users comprised 35% of the sample used in the tobacco behavior analyses (18- to 25-year olds only; see Table 1). For 13- to 17-year-olds, five of the nine pro-menthol beliefs were positively associated with intentions to use tobacco over the next year: youth who endorsed these beliefs were between 1.6 and 2.3 times more likely to intend to use tobacco. Three of the nine beliefs were associated with intentions among 18- to 25-year olds, increasing the likelihood that these young adults intended to use tobacco by 1.7 to 2.2 times, and three of nine beliefs (including two of the three that were associated with intentions) were associated with current use of tobacco products, such that respondents who endorsed these beliefs were up to 2.1 times more likely to be current rather than never tobacco users.

Discussion

In this study, we found that very few youth and young adults believed that menthol cigarettes are less risky or that menthol smokers are more attractive or popular than other smokers. However, sizeable proportions of youth and young adults held favorable views of the sensory properties of menthol cigarettes. Furthermore, when youth and young adults who did not currently use tobacco expressed positive views of menthol cigarettes, they were more likely to intend to smoke menthol cigarettes and to intend to use tobacco altogether. Parallel findings were obtained when we compared users and non-users: current smokers of menthol cigarettes and current users of tobacco products both tended to have more positive views of menthol cigarettes.

Taken together, these results indicate that youth and young adults who do not currently use tobacco and who hold favorable beliefs about menthol cigarettes—and in particular, about the sensory properties of menthol cigarettes—are at an increased risk of initiating use of menthol cigarettes and of initiating use of tobacco products in general. It is particularly concerning that beliefs about menthol cigarettes are associated with intentions to use tobacco in general, especially among 13- to 17-year-old current nonsmokers. These findings imply that initiation of tobacco use may be increased by the availability of a product that young people believe is low in nicotine, easy to smoke, refreshing in taste and sensation, and associated with increased popularity. As such, this study provides evidence broadly consistent with two of the conclusions reached by the FDA's TPSAC: promotion of menthol cigarettes increases the prevalence of smoking and the removal of menthol cigarettes from the market would benefit public health in the United States.³

These findings also have implications for the development of public education campaigns aimed at reducing tobacco use. FDA has the authority to educate the public about tobacco products, their uses, and their health effects. Mass media campaigns have been shown to

reduce smoking rates among youth,¹ and the current findings suggest that campaigns aimed at reducing favorable beliefs about menthol cigarettes could potentially have a wide reaching impact, reducing interest in both menthol cigarettes and tobacco products in general. These results also suggest that any such campaign would be wise to target beliefs related to the sensory properties of menthol cigarettes, given that these beliefs were endorsed by at least 20% and up to 58% of respondents. However, this is not to say that a campaign message should necessarily try to challenge beliefs regarding how refreshing and easy to smoke menthol cigarettes are in comparison to nonmenthols, given that these beliefs are likely to have some factual basis (i.e., menthols are designed to be more refreshing than nonmenthols). Rather, a more effective strategy may be to draw the link between these sensory characteristics and more negative outcomes such as addiction (e.g., the refreshing sensation of menthols makes it easier to become addicted to nicotine)³ or industry manipulation (e.g. the tobacco industry manipulated the characteristics of menthol cigarettes so that more young people would start to smoke).⁷ Such messages would resemble the approach widely employed by Legacy's truth® campaign, which has been shown to have contributed to reductions in the prevalence of youth smoking.³³ However, one possible risk associated with such a campaign is that these messages might inadvertently create more favorable perceptions about nonmenthol cigarettes. For instance, messages about the addictiveness of menthol cigarettes might imply that nonmenthol cigarettes are less addictive. Campaign planners should be alert to this possibility when developing and pretesting any new campaign messages.

One limitation of our study is that the question measuring awareness of menthol cigarettes (also used to define the analytic sample) did not capture those youth who know about specific menthol brands but do not know that the brands are menthol cigarettes per se (e.g., know about Newport cigarettes but do not know that they are categorized as menthols). Previous research has shown that both youth and adult smokers do not always recognize that the cigarettes they smoke are menthols,^{4,24} such that it is possible that our study underestimates awareness of menthol cigarettes. If, as a result, we inadvertently excluded some respondents who knew about and may therefore be at risk for using particular brands of menthol cigarettes, we may have risked underestimating the association between pro-menthol beliefs and intentions to begin smoking menthol cigarettes. Another limitation is that we were unable to measure smoking behavior in the full sample of 13- to 17-year-olds and instead had to rely on a measure of intentions to smoke in the next 30 days to classify these respondents as being nonsmokers. However, our validation analyses showed that the risk of misclassification using this measure was minimal. An advantage of this study is that beliefs were measured using items that compared the relative characteristics of menthol and nonmenthol cigarettes and the smokers of these cigarettes. Such measures are recommended for situations where socially desirable responding may occur,³ although to our knowledge, this is the first study to measure perceptions of menthol cigarettes in this way. Future studies may wish to employ these (or similar) items to assess adults' perceptions of menthol cigarettes or to measure beliefs about new tobacco products.

Another limitation is that all respondents were recruited from online panels, limiting the generalizability of the findings. While the SSI panel comprises more than 1 million individuals who vary widely in their characteristics, it cannot be considered representative of the U.S. population. Therefore, we supplemented the SSI sample of 13- to 17-year-olds with a group of respondents from GfK. GfK

Table 5. Association Between Endorsing Pro-menthol Beliefs and Intending to Use Tobacco Over the Next Year (Tobacco Intention Analysis) or Currently Using Tobacco (Tobacco Behavior Analysis)

		Tobacco intention analysis; 13- to 17-year-old current nonsmokers (<i>n</i> = 553)		Tobacco intention analysis; 18- to 25-year-old never tobacco users (<i>n</i> = 585)		Tobacco behavior analysis; 18- to 25-year-old never tobacco users and current tobacco users (<i>n</i> = 893)	
		% Intending	Adj. OR (95% CI)	% Intending	Adj. OR (95% CI)	% Tobacco users	Adj. OR (95% CI)
Total		32.2		23.6		34.5	
Harmful to your body ^a	Anti-menthol	30.9		20.5		35.4	
	Pro-menthol	42.2	1.66 [^] (0.96–2.90)	37.4	2.21 ^{**} (1.32–3.72)	29.1	0.86 (0.52–1.43)
Addictive ^a	Anti-menthol	31.1		21.7		34.5	
	Pro-menthol	41.8	1.72 [^] (0.95–3.10)	34.5	1.76 [^] (0.98–3.18)	33.7	1.04 (0.61–1.77)
Nicotine ^a	Anti-menthol	30.4		21.8		35.6	
	Pro-menthol	41.5	1.69 [*] (1.01–2.82)	29.8	1.33 (0.80–2.23)	29.3	0.80 (0.50–1.28)
Refreshing in taste ^b	Anti-menthol	28.8		20.5		28.5	
	Pro-menthol	40.5	1.62 [*] (1.05–2.49)	30.4	1.70 [*] (1.08–2.66)	44.5	1.81 ^{**} (1.26–2.60)
Refreshing in sensation ^b	Anti-menthol	28.0		21.5		27.5	
	Pro-menthol	42.4	1.74 [*] (1.14–2.65)	29.0	1.46 (0.92–2.32)	47.5	2.06 ^{**} (1.44–2.93)
Easy to smoke ^b	Anti-menthol	28.6		22.1		31.9	
	Pro-menthol	47.5	2.28 ^{**} (1.41–3.69)	29.8	1.43 (0.85–2.40)	43.2	1.35 (0.92–1.97)
Soothing for a sore throat ^b	Anti-menthol	29.1		21.9		28.1	
	Pro-menthol	42.3	1.54 [^] (0.99–2.40)	28.8	1.35 (0.84–2.17)	48.3	2.08 ^{**} (1.44–2.99)
Popular ^c	Anti-menthol	30.5		22.4		32.7	
	Pro-menthol	47.4	2.22 [*] (1.19–4.14)	35.0	1.69 (0.83–3.43)	45.6	1.19 (0.68–2.06)
Attractive ^c	Anti-menthol	31.7		22.7		33.3	
	Pro-menthol	43.9	1.39 (0.74–2.62)	36.0	2.23 [*] (1.06–4.69)	43.9	1.37 (0.77–2.42)

In all models, the anti-menthol belief is the reference category. All models adjust for gender, age, race/ethnicity, sensation seeking, living in a metropolitan area, sibling smoking, living with a tobacco user, and having at least one close friend who uses tobacco. Additionally, 18- to 25-year-old models adjust for education. Models that did not adjust for these covariates showed the same pattern of results, albeit with a tendency toward stronger levels of statistical significance. All analyses are restricted to participants who had heard of menthol cigarettes and who had nonmissing data on the belief variables; missing data (due to participant nonresponse) for each belief variable ranged between *n* = 0 and *n* = 14. All analyses use weighted data and significance tests adjust for complex sample design. Adj. = adjusted for covariates listed above; OR = odds ratio; CI = confidence interval.

^aPro-menthol beliefs combine the two responses indicating that “menthol cigarettes are [contain] less ...”

^bPro-menthol beliefs combine the two responses indicating that “menthol cigarettes are more ...”

^cPro-menthol beliefs combine the two responses indicating that “menthol smokers are more ...”

^{**}*p* < .01; ^{*}*p* < .05; [^]*p* < .10.

is the only Internet panel that employs address-based sampling for its panel recruitment and maintenance and is statistically representative of the U.S. population. Preliminary analyses revealed consistent results from the two samples, which both justified our decision to combine the samples and increased our confidence in the validity of the data provided by the SSI sample.

Our ability to claim evidence of causal associations is limited by the use of cross-sectional data. This is particularly a problem for the behavior analyses, given the likelihood that perceptions of the product may be influenced by current use. However, the general consistency in findings from the intention and behavioral analyses, and the fact that analyses adjusted for confounders, bolsters our confidence in the policy relevance of the observed effects. Nonetheless, given that this is the first time that belief–intention and belief–behavior associations have been demonstrated for beliefs about the favorable properties of menthol cigarettes, replication of these findings is required.

Perceptions of menthol and nonmenthol cigarettes among non-smokers—who themselves have had very little, if any, experience with tobacco products—are no doubt influenced by a range of factors, including packaging, pro-menthol advertisements within the media and at the point of sale, and the experiences of friends and family who have used menthol or other tobacco products.^{1,3} Although we found that pro-menthol beliefs were endorsed by less than half (or more commonly, less than one fifth) of these youth and young adults, it is notable that many of these beliefs were positively associated with future intentions and current use of, not only menthol cigarettes, but tobacco products in general. These findings demonstrate that the availability of menthol cigarettes may well contribute to tobacco use initiation among youth, and should therefore inform the FDA as it works to decide what action, if any, will be taken to curb the prevalence of menthol cigarette use.

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Declaration of Interests

None declared.

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