

Longitudinal Response to Restrictions on Menthol Cigarettes Among Young Adult US Menthol Smokers, 2011–2016

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Objectives. To examine responses to hypothetical restrictions on menthol cigarettes among young adult menthol smokers in the United States.

Methods. We surveyed Truth Initiative Young Adult Cohort respondents 18 to 34 years of age every 6 months from December 2011 through October 2016. Menthol cigarette smokers ($n = 806$, $n = 1963$ observations) indicated their response if menthol cigarettes were unavailable. Weighted analyses accounting for repeated measures were used to estimate the prevalence and correlates of responses and trends over time.

Results. Overall, 23.5% of young adult menthol smokers said they would quit if menthol cigarettes were unavailable, with this response largely unchanged between 2011 and 2016. There was a significant increase in the switch to another tobacco product response (from 7.4% to 13.2%; $P = .01$) associated with current noncigarette use. In adjusted analyses, African Americans, women, those with less than a high school education, and those with any quit intention were more likely to say they would quit smoking.

Conclusions. Increased intentions to switch products suggest the acceptability and availability of alternatives to menthol cigarette smokers. Menthol cigarette restrictions benefit vulnerable groups and those interested in quitting, but the availability of menthol in noncigarette products could limit benefits. (*Am J Public Health.* 2019;109:1400–1403. doi:10.2105/AJPH.2019.305207)

In 2009, US federal law banned characterizing flavors in cigarettes with the exception of menthol. Menthol cigarette use is more prevalent among African Americans, Hispanics, smokers of lower socioeconomic status, and women, possibly contributing to cancer risk disparities.¹ According to an estimate from one study, banning menthol could drop smoking prevalence by 9% by 2050.² The Food and Drug Administration announced plans to ban menthol in combustible tobacco, including cigarettes, and restrict flavored e-cigarette sales to “adult-only” locations but has not yet taken regulatory action.³

Understanding what menthol cigarette smokers would do after a ban is critical to identifying its public health impact. According to various studies, 39% of adult menthol smokers said they would quit if menthol cigarettes were unavailable,⁴ 15% would

switch to menthol e-cigarettes,⁵ 13% would switch to nonmenthol cigarettes,⁴ 15% would switch to another product,⁶ almost 30% did not know what they would do,⁷ and 25% had multiple responses, such as switching to nonmenthol cigarettes and another product.⁴ Switching to e-cigarettes may lead to a lower toxicant and carcinogen burden,⁸ whereas switching to other combustible products (e.g., cigars) is likely to result in a health burden similar to that of cigarettes.⁹ This suggests that public health benefits of menthol restrictions could also occur if a substantial proportion of menthol cigarette

smokers who cannot quit were to switch to potentially less harmful noncombustible products.¹⁰

In this study, we used data from 8 waves of the Truth Initiative Young Adult Cohort (YA Cohort) to examine trends in behavioral responses to hypothetical restrictions on menthol cigarettes among young adult menthol cigarette smokers and assess demographic and tobacco use correlates of responses.

METHODS

The YA Cohort is a national sample of young adults 18 to 34 years of age drawn from Growth from Knowledge’s KnowledgePanel and recruited via address-based sampling of the US population. Between 2011 and 2016, participants were surveyed biannually online in English and Spanish, and the sample was refreshed at each wave to retain the initial sample size and incorporate younger participants as the cohort aged. In this study, we analyzed data from waves 2 through 8 and wave 10 (December 2011 through October 2016); behavioral responses to a ban were not gathered in wave 9. We restricted our analysis to menthol cigarette smokers who participated in any of the study waves (806 unique respondents and 1963 observations; Table A, available as a supplement to the online version of this article at <http://www.ajph.org>).

Past-30-day menthol cigarette smokers were asked “If menthol cigarettes were no longer sold, which of the following would

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TABLE 1—Sample Characteristics and Logistic Regression of Young Adult Menthol Cigarette Smokers' Behavioral Responses to Menthol Restrictions: United States, 2011–2016

	Overall Sample (n = 806), No. (%)	Response to Policy			
		Switch to Nonmenthol (n = 793), AOR (95% CI)	Switch to Some Other Product (n = 245), AOR (95% CI)	Quit Smoking (n = 467), AOR (95% CI)	Don't Know Response (n = 363), AOR (95% CI)
Demographics					
Age group, y					
25–34	395 (52.4)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
18–24	379 (47.6)	0.74 (0.52, 1.05)	1.12 (0.70, 1.80)	1.34 (0.88, 2.04)	1.41 (0.97, 2.03)
Race/ethnicity					
Non-Hispanic White	453 (49.9)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
Non-Hispanic African American	148 (25.8)	0.28 (0.16, 0.49)	0.78 (0.40, 1.51)	2.16 (1.31, 3.55)	1.81 (1.13, 2.88)
Other non-Hispanic	58 (6.1)	1.08 (0.60, 1.93)	0.99 (0.41, 2.37)	0.55 (0.26, 1.13)	1.40 (0.75, 2.59)
Hispanic	145 (18.2)	0.52 (0.33, 0.82)	2.01 (1.16, 3.49)	1.27 (0.77, 2.10)	0.91 (0.55, 1.51)
Gender					
Male	320 (49.1)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
Female	484 (50.9)	0.48 (0.34, 0.67)	0.71 (0.46, 1.11)	2.21 (1.48, 3.29)	1.34 (0.93, 1.93)
Education					
≥ some college	435 (45.0)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
High school	262 (34.5)	0.75 (0.49, 1.13)	0.68 (0.40, 1.18)	1.07 (0.68, 1.69)	1.43 (0.97, 2.09)
< high school	107 (20.6)	1.10 (0.66, 1.81)	0.91 (0.48, 1.73)	1.87 (1.01, 3.48)	0.57 (0.29, 1.10)
LGB					
No	362 (89.0)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
Yes	53 (11.0)	1.22 (0.72, 2.06)	0.82 (0.40, 1.66)	0.77 (0.41, 1.44)	1.20 (0.72, 1.99)
Time-varying covariates					
Intention to quit					
No plan on quitting	404 (24.7)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
Within the next 30 d	252 (12.5)	0.28 (0.14, 0.56)	0.60 (0.25, 1.45)	5.28 (2.37, 11.78)	1.69 (0.89, 3.20)
Within the next 6 mo	621 (30.5)	0.45 (0.28, 0.72)	0.63 (0.34, 1.16)	4.47 (2.26, 8.83)	0.85 (0.52, 1.38)
Longer than 6 mo	635 (32.4)	0.42 (0.27, 0.66)	0.72 (0.40, 1.33)	3.10 (1.59, 6.08)	1.17 (0.73, 1.90)
Time to first use, min					
> 60	576 (26.5)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
31–60	357 (18.2)	0.73 (0.44, 1.19)	1.58 (0.78, 3.24)	0.76 (0.45, 1.29)	1.13 (0.67, 1.91)
5–30	858 (46.6)	0.99 (0.67, 1.46)	1.42 (0.82, 2.46)	0.49 (0.31, 0.79)	1.29 (0.86, 1.94)
< 5	137 (8.7)	1.07 (0.52, 2.21)	1.80 (0.69, 4.67)	0.32 (0.13, 0.77)	1.79 (1.01, 2.94)
Used other noncigarette tobacco product in past 30 d					
No	1532 (78.1)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
Yes	401 (21.9)	1.15 (0.58, 2.28)	2.09 (1.03, 4.24)	1.14 (0.56, 2.32)	0.50 (0.23, 1.09)
Wave					
2	272 (14.0)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
3	228 (10.5)	0.43 (0.22, 0.84)	0.90 (0.34, 2.36)	1.60 (0.75, 3.40)	1.44 (0.68, 3.08)
4	294 (15.1)	0.63 (0.34, 1.16)	1.95 (0.73, 5.21)	0.60 (0.27, 1.32)	1.79 (0.94, 3.43)
5	262 (13.8)	0.71 (0.38, 1.31)	1.29 (0.48, 3.46)	0.93 (0.43, 2.02)	1.67 (0.83, 3.36)
6	263 (13.8)	0.68 (0.34, 1.35)	2.26 (0.93, 5.46)	0.68 (0.31, 1.49)	2.54 (1.32, 4.92)
7	224 (11.4)	0.59 (0.34, 1.04)	2.55 (1.09, 5.99)	1.21 (0.60, 2.41)	1.32 (0.69, 2.52)
8	223 (11.0)	0.68 (0.38, 1.24)	2.03 (0.84, 4.93)	0.94 (0.47, 1.89)	1.73 (0.93, 3.20)
10	197 (10.4)	0.53 (0.14, 1.98)	0.86 (0.15, 4.94)	1.38 (0.40, 4.73)	1.78 (0.58, 5.48)

Note. AOR = adjusted odds ratio; CI = confidence interval; LGB = lesbian/gay/bisexual. The sample size was 806, and the number of observations was 1963. Refused and “other” responses are omitted, so the numbers of observations across behavioral responses do not sum to the total of 1963. Sample size numbers and percentages for demographic covariates are based on first responses by unique respondents; sample size numbers and percentages for time-varying covariates are based on numbers of observations across waves.

you most likely do?” Potential responses were (1) switch to nonmenthol cigarettes, (2) switch to some other tobacco product, (3) quit smoking and not use any other product, and (4) don’t know.

We examined the demographic correlates of age group, race/ethnicity, gender, sexual identity, and education (measured at study entry). Time-varying correlates were past-30-day use of any noncigarette tobacco product, nicotine dependence according to time to first cigarette or tobacco product after waking, and intention to quit tobacco totally.

We present data on responses to restrictions on menthol cigarettes overall and by wave using robust variance estimators to account for correlation between repeated measures. We used the *lmtest* package in R version 3.3.2 (R Foundation for Statistical Computing, Vienna, Austria) to test linear trends in reporting over waves. We conducted multivariable logistic regression analyses using SVY procedures in Stata version 14.2 (StataCorp LP, College Station, TX), including survey weights accounting for the complex study design and nonresponse and robust variance estimators, to examine the odds of each behavioral response by demographic and time-varying correlates. Data with relative standard errors above 30% were flagged.

RESULTS

Overall sample characteristics are described in Table 1. At most waves, the greatest percentage of respondents would switch to a nonmenthol cigarette (mean of 32.3%) or did not know what they would do if menthol cigarettes were unavailable (mean of 30.8%; Figure A, available as a supplement to the online version of this article at <http://www.ajph.org>). With respect to other responses, a mean of 23.5% of participants reported that they would quit and not use any other products, and on average 10.7% reported that they would switch to some other product. The switching to some other product response showed a significant positive linear trend ($b = 0.71$; $P = .01$) over time. No other linear trends were significant.

Menthol smokers with any quit intention, African Americans, those with less than a high school education, and women had greater

odds of reporting that they would quit if menthol cigarettes were unavailable. Those who smoked sooner after waking had lower odds of endorsing quitting smoking. Those who had any plan to quit, African Americans, Hispanics, and women were less likely to report that they would switch to a nonmenthol cigarette in response to restrictions, perhaps indicating a stronger menthol cigarette preference among these groups. Respondents who had used a noncigarette tobacco product in the past 30 days and Hispanics were more likely to report that they would switch to some other product if menthol cigarettes were unavailable. African Americans and those who smoked within 5 minutes of waking were more likely to not know what they would do in response to menthol restrictions.

DISCUSSION

This study is the first to our knowledge to examine young adult menthol smokers’ behavioral responses to menthol restrictions over time. Nearly one quarter of young adult menthol smokers said that they intended to quit if faced with a menthol ban. This proportion was stable over time and lower than that reported in a national sample of all adults, 39% of whom said they would quit smoking if menthol were banned.⁴ Banning menthol cigarettes may prompt quitting among those with an intention to quit and those with lower levels of nicotine dependence, consistent with previous studies.^{4,7} Importantly, behavioral intentions to quit may underestimate actual behavior. A study of a menthol cigarette ban in Ontario, Canada, showed that more menthol smokers made a serious quit attempt after the ban (60%) than was reported prior to the ban (30%).¹¹

Switching to nonmenthol cigarettes showed a nonsignificant decreasing trend, suggesting that menthol preference may strengthen over time. Menthol restrictions may be particularly beneficial for vulnerable groups, such as African Americans, with stronger menthol preferences. There was a significant increasing trend in endorsing switching to some other tobacco product if menthol cigarettes were banned. After the federal cigarette flavor ban,

noncigarette product use increased among adolescents, suggesting substitution with remaining flavored products.¹² Although switching from menthol cigarettes to potentially lower harm noncombustible products may have public health benefits,¹⁰ switching to alternative combustible products could mitigate the impact. Participants’ likelihood of not knowing what they would do if menthol were banned was high and stable over time. Undecided young adult menthol smokers may be encouraged to quit if public education about such a policy and cessation resources are widely available.

A limitation of our study is that the sample was refreshed at each wave, so we lacked complete follow-up data. We used robust variance estimators to address correlation due to repeated measures and accounted for study wave. We lacked information about individuals who may have already quit or switched or did not respond to one or more survey waves. We did not incorporate examples regarding switching to other “tobacco products,” perhaps underestimating e-cigarette switching. Finally, our study allowed respondents to select only one response option. Other investigators have used a check-all-that-apply format and found that other responses or combinations are possible.^{4,7}

PUBLIC HEALTH IMPLICATIONS

Banning menthol may provide an opportunity for quitting among a quarter of young adult smokers, particularly African Americans and smokers interested in quitting. If such a ban were enacted, framing public education and having cessation resources available would be critical in supporting quitting. Over time, a small but increasing proportion of individuals indicated that they would switch to another product in the event of a ban. Food and Drug Administration review and regulation of products such as e-cigarettes is critical so that, should a menthol ban take effect, smokers who cannot quit will move to less harmful alternatives rather than other combustibles. The continued availability of menthol and flavors in combustibles may limit the public health benefits of menthol sales restrictions. **AJPH**

CONTRIBUTORS

S. W. Rose drafted the article, Y. Zhou conducted analyses, and A. C. Villanti and J. Rath led the parent study. All of the authors contributed to the study design, research questions, and analysis plan and reviewed drafts of the article.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

HUMAN PARTICIPANT PROTECTION

No protocol approval was needed for this study because de-identified secondary data were used.

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