



# Adults' favorability toward prohibiting flavors in all tobacco products in the United States

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## ABSTRACT

In November 2018, US Food and Drug Administration announced its intent to prohibit menthol in combustible tobacco products, prohibit flavored cigars, and prohibit flavored e-cigarettes unless they are sold in age-restricted, in-person locations. This study assessed adult attitudes toward prohibiting flavors in all tobacco products, including e-cigarettes. Data were from the 2016 *Summer Styles* survey of 4203 US adults aged  $\geq 18$  years. Respondents were asked whether they favored or opposed prohibiting flavors (e.g., menthol, spicy, sweet, or fruity flavor) in all tobacco products. Prevalence and correlates of favorability were assessed using weighted percentages and adjusted prevalence ratios (aPR) respectively. Assessed correlates were: sex, age, race/ethnicity, income, US Census region, marital status, children < 18 years living in the home, perceptions toward e-cigarette advertising, and current (past 30-day) tobacco product use. Overall, 47.3% of adults reported favorable attitudes toward prohibiting flavors in all tobacco products. By tobacco product use status, prevalence was 52.0%, 48.4%, and 34.8% among never, former, and current users, respectively ( $p < .05$ ). Among current tobacco product users, favorability was more likely among adults who believed e-cigarette ads exposure makes youth think about smoking (aPR = 1.82; 95% CI = 1.20–2.78) and those with any children aged < 18 years in their household (aPR = 1.38; 95% CI = 1.05–1.82). To conclude, nearly half of adults favored prohibiting flavors in all tobacco products, including e-cigarettes. Prohibiting flavors in tobacco products could benefit public health by reducing both individual-level and population-level harms, including tobacco use initiation especially among youth.

## 1. Introduction

The use of flavor additives, such as fruit, menthol, alcohol, or candy, in tobacco products can increase the appeal of these tobacco products, particularly to young people.(Carpenter et al., 2005; Corey et al., 2015; Lewis and Wackowski, 2006; Manning et al., 2009) Flavors such as menthol provide a soothing effect on the airways and can mask the harshness of tobacco smoke, thereby increasing the ease of experimentation.(Alpert et al., 2016; Sokol et al., 2014; Yerger and McCandless, 2011; Ahijevych and Garrett, 2010; Klausner, 2011; Kreslake et al., 2008; Kreslake and Yerger, 2010) Additionally, certain flavor descriptors could elicit cognitive and emotional responses, and could diminish relative perceptions of harm.(Brown et al., 2014; Chen et al., 2010; Ambrose et al., 2014; Kaleta et al., 2016)

Flavored tobacco products are commonly used by US tobacco users, especially among younger users.(Corey et al., 2015) which is consistent with research showing that sweet preferences in humans are highest in adolescence.(De Graaf and Zandstra, 1999; Desor and Beauchamp, 1987; Desor et al., 1975) Among US students in grades 6–12 who were

current tobacco users in 2014, a majority reported using flavored products, including 63.3% of e-cigarette users, 60.6% of hookah users, 63.5% of cigar smokers, 53.6% of cigarette smokers, and 58.8% of smokeless tobacco users.(Corey et al., 2015) Moreover, a majority of youth tobacco product users report that the first product they used was flavored, and youth consistently report flavoring as a major reason for use.(Corey et al., 2015) Among adults, a recent study revealed that two of five current tobacco users in the US usually used a flavored product, and those flavored tobacco users were more likely to report behaviors that indicate tobacco dependence.(Odani et al., 2019) Thus, prohibiting flavor additives in tobacco products can be beneficial to both youth and adults by reducing the appeal of tobacco products as well as the likelihood of initiation, and promoting cessation rates among tobacco product users.(Odani et al., 2019; Administration UFaD, 2012).

The 2009 Family Smoking Prevention and Tobacco Control Act (FSPTCA) gave the US Food and Drug Administration (FDA) the authority to regulate the manufacture, marketing, and sale of tobacco products.(Congress.gov, 2009) Under this authority, FDA in 2009 prohibited the use of all characterizing flavors in cigarettes, except

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menthol. Menthol cigarettes account for approximately one third of cigarette market shares and are popular among certain population groups, including youth and those who are non-Hispanic black. (Federal Trade Commission, 2016; US Food and Drug Administration, 2018) In 2016, FDA implemented the deeming rule that extended its regulatory authority over all tobacco products, including emerging products such as e-cigarettes. (Federal Register, 2016) More recently, in November 2018, FDA indicated its intent to prohibit menthol in combustible tobacco products and flavored cigars, and prohibit sales of flavored e-cigarettes (excluding tobacco and menthol flavors), except those sold in age-restricted, in-person retail outlets. (US Food and Drug Administration, 2018)

Population attitudes can guide implementation and sustainment of evidence-based tobacco control interventions. A 2010 US study investigated public support for FDA regulation of menthol in cigarettes, and found that only 20.0% of US adults agreed that menthol flavoring should be banned. (Pearson et al., 2012) However, several changes have occurred in the US tobacco control landscape since then, including the introduction of several new tobacco products, the decline in youth cigarette smoking; as well as increased scope of FDA's regulatory authority under the deeming rule (Corey et al., 2015; Federal Trade Commission, 2016; US Food and Drug Administration, 2018). Recent knowledge of attitudes toward prohibiting flavored tobacco products is important given the role of the public in helping to enforce regulatory and population-based interventional efforts in the US. Therefore, this study assessed prevalence and correlates of adults' attitudes toward prohibiting all flavored tobacco products, including e-cigarettes.

## 2. Methods

### 2.1. Data source

Data were from the 2016 wave of the *Summer Styles* survey (the second wave of a series of *Styles* survey), a web-based survey of adults aged  $\geq 18$  years conducted during June–July in the US. A total of 4203 adults were selected randomly from a pool of about 55,000 online panelists (response rate = 68%). Panelists were randomly recruited using probability-based sampling by address to reach respondents regardless of whether or not they had landline phones or Internet access. Non-response weights were computed such that underlying distribution of participants on key demographic variables matched US Current Population Survey proportions (US Census Bureau, 2019) on nine factors: sex, age, annual household income, race/ethnicity, household size, education, US Census region, metro status (whether residing in metropolitan statistical area delineated by the US Office of Management and Budget), and Internet access. Data were weighted to the US adult population aged  $\geq 18$  years. This secondary analysis of de-identified data did not involve human subjects and was exempt from an ethics review by the institutional review board (IRB).

### 2.2. Measures

#### 2.2.1. Attitudes toward prohibiting flavored tobacco products

Attitudes toward prohibiting flavored tobacco products was determined using the question, “Do you favor or oppose prohibiting flavors such as menthol (mint), spicy, sweet, or fruity flavor, in all tobacco products, including in electronic vapor products, such as electronic cigarettes (e-cigarettes), electronic hookahs (e-hookahs), or vape pens?” Favorability was defined as a response of “Strongly favor” or “Somewhat favor.”

#### 2.2.2. Tobacco-related behaviors and beliefs

The following two questions were used to assess tobacco product use: “Have you ever tried any of the following products, even just one time?” and “In the past 30 days, which of the following products have you used at least once?” For both questions, categorical response options were grouped into seven classes or types of products: cigarettes; cigars

(including big cigars, little cigars, and cigarillos); smokeless tobacco products (including chewing tobacco/snuff/dip; snus; and dissolvable tobacco products); electronic nicotine delivery systems (including e-cigarettes, e-hookahs, hookah pens, vape pens, e-cigars, e-pipes); loose tobacco products (including pipe tobacco and roll-your-own [RYO] cigarettes); water pipes/hookahs; and other products not specified.

Current tobacco product users were defined as persons who reported using at least one of the seven tobacco product types at least once in the past 30 days. Former tobacco product users were persons who reported ever use of at least one product type, but were not current (past 30-day) users of tobacco product at the time of the survey. Never tobacco product users were persons who reported never having used any of the seven tobacco product types in their lifetime. Current tobacco product users were further classified based on the product types they used: exclusive combustible tobacco product users (those who used cigarettes, cigars, loose tobacco products, and/or water pipes/hookahs); exclusive non-combustible tobacco product users (those who used smokeless tobacco products and/or electronic nicotine delivery systems), and; dual users of combustible and non-combustible tobacco products.

Considering that flavors are a common promotional feature in advertisements of emerging tobacco products such as e-cigarettes, respondents' perceptions about the consequences of adolescents' exposure to such advertisements were also assessed in the context of favorability. Respondents were asked: “Please indicate how much you agree or disagree with the following statement: E-cigarettes advertisements can make adolescents think about smoking regular cigarettes.” There were five response options, which were recoded into three groups: Agree (“Strongly agree” or “Somewhat agree”), Undecided (“Neither agree nor disagree”), or disagree (“Somewhat disagree” or “Strongly disagree”).

#### 2.2.3. Socio-demographic characteristics

Assessed sociodemographic characteristics included: sex, age, race/ethnicity, annual household income, US Census region, marital status, and presence of any children aged  $< 18$  years living in the household.

### 2.3. Analyses

Analyses were performed separately for all adults and current tobacco product users. Prevalence estimates of attitudes toward prohibiting flavored tobacco products were calculated with 95% confidence intervals (CI), overall and among subgroups. Within-group differences were determined with chi-squared tests; a standard (non-trend) chi-squared test was used for nominal variables, while a trend test was used for ordinal variables (i.e. age and annual household income). Statistical significance was set at  $p < .05$ .

To determine predictors of favorability toward prohibiting flavored tobacco products, multivariable binary logistic regression models were fitted to calculate adjusted prevalence ratios (aPR). (Thompson et al., 1998) The following variables were used as independent variables: sex, age, annual household income, presence of any children aged  $< 18$  years in household, race/ethnicity, US Census region, marital status, perception about the consequences of e-cigarette marketing among adolescents, and current tobacco product use status (the latter included only in the model for all US adults overall). Selection of variables was based on the findings from previous studies on public attitudes toward tobacco control laws. (Odani et al., 2018; Wang et al., 2016; Tynan et al., 2019) To reduce collinearity, each independent variable was iteratively modelled, adjusting for age, sex, race/ethnicity, income, and tobacco product use status as appropriate. All analyses were performed using R, version 3.5.1.

**Table 1**

Percentages with 95% confidence intervals (CI) that strongly or somewhat supported a prohibition on all tobacco flavors among adults aged ≥ 18 years, Summer Styles Survey, 2016.

Characteristics	All US adults			Current tobacco users		
	N	% (95% CI)	P-value ( $\chi^2$ )	N	% (95% CI)	P-value ( $\chi^2$ )
Overall	4203	47.3 (45.5–49.1)		731	34.8 (30.5–39.0)	
Sex						
Male	1997	45.6 (42.9–48.2)	0.074	415	33.0 (27.5–38.5)	0.327
Female	2206	48.9 (46.4–51.5)		316	37.3 (30.6–43.9)	
Age, years						
18–24	265	51.5 (44.9–58.1)	0.443	38	39.8 (22.4–57.2)	
25–44	1215	46.7 (43.4–50.0)		262	35.8 (28.9–42.7)	0.432
45–64	1766	46.4 (43.6–49.1)		335	30.7 (25.0–36.4)	
65 +	957	47.4 (43.6–51.1)		96	41.6 (28.8–54.3)	
Annual income, \$						
< 20,000	571	46.1 (40.9–51.3)	0.739	178	45.3 (35.9–54.6)	0.024
20,000 to 49,999	1156	47.3 (43.7–50.9)		232	27.5 (20.2–34.8)	
50,000 to 99,999	1350	46.5 (43.3–49.7)		200	35.8 (28.0–43.7)	
≥ 100,000	1126	48.9 (45.4–52.4)		121	32.2 (22.8–41.5)	
Presence of child < 18 years in household						
No	2805	46.5 (44.3–48.7)	0.164	473	32.0 (27.0–37.0)	0.058
Yes	1394	49.3 (46.0–52.6)		255	40.9 (33.0–48.8)	
Race/ethnicity						
White, non-Hispanic	3104	47.9 (45.8–49.9)	0.223	527	33.6 (28.7–38.5)	0.538
Black, non-Hispanic	424	41.2 (35.5–46.9)		101	33.3 (22.2–44.4)	
Hispanic	122	49.4 (44.1–54.8)		73	43.6 (29.9–57.3)	
Other, non-Hispanic	469	47.1 (38.6–55.6)		30	31.8 (8.7–54.9)	
US census region						
Northeast	777	46.8 (42.6–51.1)	0.660	120	44.8 (34.2–55.3)	0.099
Midwest	1027	47.5 (43.8–51.2)		208	38.1 (29.5–46.6)	
South	1501	46.2 (43.1–49.3)		286	30.4 (24.0–36.8)	
West	898	49.2 (45.3–53.2)		117	31.2 (21.3–41.2)	
Marital status						
Married/living with partner	2626	47.9 (45.7–50.2)	0.420	394	35.3 (29.8–40.9)	0.927
Widowed/divorced/separated	771	44.3 (39.9–48.8)		183	35.3 (26.1–44.4)	
Never married	806	47.6 (43.5–51.7)		154	33.4 (24.4–42.3)	
Perception e-cigarette advertisements could lead to smoking						
Disagree	505	31.9 (26.9–36.8)	< 0.001	118	22.9 (13.8–31.9)	0.009
Undecided	1192	42.5 (39.1–45.9)		270	32.7 (25.8–39.6)	
Agree	2472	53.4 (51.0–55.8)		341	41.3 (34.9–47.6)	
Tobacco use status <sup>a</sup>						
Never tobacco user	1513	52.0 (48.9–55.0)		N/A	N/A	
Former tobacco user	1941	48.4 (45.7–51.0)	< 0.001	N/A	N/A	N/A
Current tobacco user	731	34.8 (30.5–39.0)		N/A	N/A	
Tobacco product used <sup>b</sup>						
Combustible tobacco product (exclusive)	N/A	N/A	N/A	553	36.5 (31.5–41.4)	0.254
Non-combustible tobacco product (exclusive)	N/A	N/A		85	27.6 (16.8–38.4)	
Both combustible and non-combustible tobacco product	N/A	N/A		90	29.6 (18.6–40.5)	

Note: N/A = Not applicable. Chi squared statistics for age and annual household income were performed with a trend test; all others were performed with a standard chi squared test.

<sup>a</sup> Never tobacco users are those who never used any of the following tobacco product types, not even once in their lifetime: cigarettes, cigars, electronic nicotine delivery systems, loose tobacco, water pipes, smokeless tobacco, dissolvable tobacco, and other tobacco product not specified. Former tobacco users are those who used 1 of the following tobacco product types at least once in their lifetime but not in the past 30 days. Current tobacco user are those who used ≥ 1 of the following tobacco product types in the past 30 days.

<sup>b</sup> Combustible tobacco products include cigarettes, cigars, loose tobacco, and water pipes. Non-combustible tobacco products include electronic nicotine delivery systems, smokeless tobacco, and dissolvable tobacco.

### 3. Results

#### 3.1. Characteristics of participants

Among all study respondents, 17.8% were current tobacco product users, 42.5% were former tobacco product users, and 39.7% were never tobacco product users. Mean age of all adults was approximately 47 years. Overall, 48.3% of adults were male, 58.3% were married or living with a partner, 65.1% were non-Hispanic white, and 62.1% earned \$50,000 or higher per annum (data now shown in Table).

#### 3.2. Descriptive analysis - favorability among all adults

Among all adults, 47.3% supported prohibiting flavors in all tobacco products (Table 1); 25.1% strongly favored, 22.2% somewhat favored,

29.1% somewhat opposed, and 23.6% strongly opposed (data not shown in Table). Favorability differed significantly by tobacco product use status; prevalence was 52.0%, 48.4%, and 34.8% among never, former, and current tobacco product users, respectively. Favorability to prohibit flavors in all tobacco products was 31.9%, 42.5%, and 53.4% among adults who disagreed, were undecided, or agreed that exposure to e-cigarette advertisements could make youth think about smoking, respectively (all  $p < .05$ ). No statistically significant difference in favorability was observed by sex, age group, annual household income, presence of any children in the household, race/ethnicity, US Census region, or marital status.

#### 3.3. Descriptive analysis - favorability among current tobacco users

Among current tobacco users, favorability varied by annual

**Table 2**  
Adjusted Prevalence Ratios (aPR) with 95% confidence intervals (CI) that strongly or somewhat supported for a prohibition on all tobacco flavors among adults aged  $\geq 18$  years, Summer Styles Survey, 2016.

Characteristics	All US adults (N = 4203)	Current tobacco users (N = 731)
	aPR (95% CI)	aPR (95% CI)
Sex		
Male	1.00 (referent)	1.00 (referent)
Female	1.06 (0.98–1.14)	1.15 (0.91–1.46)
Age, years (per unit increase)	1.00 (0.99–1.00)	1.00 (0.99–1.01)
Annual income, \$		
< 20,000	1.00 (referent)	1.00 (referent)
20,000 to 49,999	0.99 (0.86–1.13)	0.60 (0.43–0.84)
50,000 to 99,999	0.95 (0.83–1.08)	0.77 (0.57–1.03)
$\geq 100,000$	0.98 (0.86–1.12)	0.73 (0.51–1.04)
Presence of child < 18 years in household		
No	1.00 (referent)	1.00 (referent)
Yes	1.07 (0.98–1.17)	<b>1.38 (1.05–1.82)</b>
Race/ethnicity		
White, non-Hispanic	1.00 (referent)	1.00 (referent)
Black, non-Hispanic	0.78 (0.60–1.01)	0.93 (0.53–1.63)
Hispanic	1.05 (0.83–1.33)	0.93 (0.34–2.60)
Other, non-Hispanic	0.87 (0.61–1.23)	1.41 (0.78–2.54)
US census region		
Northeast	1.00 (referent)	1.00 (referent)
Midwest	1.04 (0.92–1.17)	0.86 (0.63–1.18)
South	1.01 (0.90–1.13)	0.65 (0.48–0.90)
West	1.03 (0.92–1.17)	0.64 (0.43–0.95)
Marital status		
Married/living with partner	1.00 (referent)	1.00 (referent)
Widowed/divorced/separated	0.95 (0.84–1.06)	0.91 (0.66–1.25)
Never married	0.98 (0.88–1.09)	0.86 (0.62–1.18)
Perception e-cigarette ads could make youth think about smoking		
Disagree	1.00 (referent)	1.00 (referent)
Undecided	<b>1.22 (1.12–1.35)</b>	1.28 (0.99–1.64)
Agree	<b>1.67 (1.41–1.96)</b>	<b>1.82 (1.20–2.78)</b>
Tobacco use status <sup>a</sup>		
Never tobacco user	1.00 (referent)	N/A
Former tobacco user	0.94 (0.86–1.02)	N/A
Current tobacco user	<b>0.67 (0.59–0.77)</b>	N/A
Tobacco product used <sup>b</sup>		
Combustible tobacco product (exclusive)	N/A	1.00 (referent)
Non-combustible tobacco product (exclusive)	N/A	0.76 (0.42–1.37)
Both combustible and non-combustible tobacco product	N/A	0.76 (0.43–1.34)

Note: N/A = Not applicable; aPR = adjusted prevalence ratio. AOR with p-values < .05 were typed in bold.

<sup>a</sup> Never tobacco users are those who never used any of the following tobacco product types, not even once in their lifetime: cigarettes, cigars, electronic nicotine delivery systems, loose tobacco, water pipes, smokeless tobacco, dissolvable tobacco, and other tobacco product not specified. Former tobacco users are those who used 1 of the following tobacco product types at least once in their lifetime but not in the past 30 days. Current tobacco user are those who used  $\geq 1$  of the following tobacco product types in the past 30 days.

<sup>b</sup> Combustible tobacco products include cigarettes, cigars, loose tobacco, and water pipes. Non-combustible tobacco products include electronic nicotine delivery systems, smokeless tobacco, and dissolvable tobacco.

household income; prevalence was highest among those with annual household incomes < \$20,000 (45.3%) and lowest among those earning \$20,000–49,999 per annum (27.5%) (Table 1). Favorability was 22.9%, 32.7%, and 41.3% among current tobacco product users who disagreed, were undecided, or agreed that exposure to e-cigarette advertisements could lead to cigarette smoking among adolescents, respectively (all  $p < .05$ ). No statistically significant differences in favorability to prohibit flavors in tobacco products were observed by

sex, age group, presence of any children in the household, race/ethnicity, US Census region, or marital status. Although the difference was not statistically significant, prevalence of favorability was 27.6% among exclusive users of non-combustible tobacco products, 29.6% among dual users of combustible and non-combustible tobacco products, and 36.5% among exclusive users of combustible tobacco products.

#### 3.4. Adjusted analysis – favorability and correlates among all adults

Adjusting for socio-demographic characteristics (Table 2), favorability to prohibit flavors in tobacco products was less prevalent in current tobacco users (aPR = 0.67; 95% CI = 0.59–0.77) compared to never tobacco users. Regarding the statement that e-cigarette ads could make youth think about smoking, favorability was higher among those who agreed (aPR = 1.67; 95% CI = 1.41–1.96) and those who were undecided (aPR = 1.22; 95% CI = 1.12–1.35) in comparison to those who disagreed with this statement. All other factors did not have a statistically significant association with favorability toward prohibiting flavors in all tobacco products.

#### 3.5. Adjusted analysis – favorability and correlates among current tobacco users

Within adjusted analyses, the odds of favorability toward prohibiting flavored tobacco products was lower among current tobacco product users living in the South (aPR = 0.65; 95% CI = 0.48–0.90), and West (aPR = 0.64; 95% CI = 0.43–0.95) compared to those living in the Northeast (Table 2). Favorability was significantly higher among adults with any children aged < 18 years living in their household compared to those with none (aPR = 1.38; 95% CI = 1.05–1.82). Furthermore, compared to those who disagreed that e-cigarette advertisements could lead to cigarette smoking among adolescents, favorability was higher among current tobacco users who agreed (aPR = 1.82; 95% CI = 1.20–2.78). Favorability did not vary by the other assessed factors.

## 4. Discussion

The findings from this study reveal that about half of adults favored prohibiting flavored tobacco products, including e-cigarettes. Favorability varied significantly by tobacco product use status, with 1 in 3 current tobacco product users reporting favorability compared to 1 in 2 never tobacco product users. The low favorability among non-combustible tobacco product users might be because of the wide availability and popularity of flavors in non-combustible tobacco products. For example, recent study suggested that approximately one-third (34.3%) of US adult e-cigarette users cite flavors as their reason for using e-cigarettes (Patel et al., 2016) and that the varieties of flavors in e-cigarettes far exceed those previously documented for any other tobacco product, with one study reporting over 7764 distinct flavors as of January 2014 (Zhu et al., 2014).

A prohibition on flavors in all tobacco products could benefit public health by reducing both individual-level (e.g., addiction, toxicity, carcinogenicity, teratogenicity, morbidity, and mortality) and population-level harms (smoking incidence, prevalence, relapse, per capita tobacco consumption, secondhand smoke exposure, and tobacco-related economic costs) (Odani et al., 2019; US Department of Health and Human Services, 2014). Previous studies have found that between a third and two-thirds of menthol smokers have reported that they would try to quit smoking if menthol cigarettes were to be prohibited (Pearson et al., 2012; O'Connor et al., 2012; Wackowski et al., 2014). However, some concerns have also been expressed by the public regarding the implementation of flavor ban: the ban would infringe on freedom of consumers' choice and possibly lead to a large black market (Cheyney et al., 2014). High level of public support is key to reducing such

concerns.(Pearson et al., 2012) In the present study, we found that half of adults opposed prohibiting all flavored tobacco products while the other half favored. This underscores the importance of implementation of educational campaigns that highlights the potential public health benefits of ban on flavors in all tobacco products.

A previous study conducted in 2010 showed that support for a potential FDA ban on menthol cigarettes was highest among populations with the highest prevalence of menthol cigarette use, such as Hispanics, African Americans, and respondents with less than a high school education.(Pearson et al., 2012) Among overall adults in the present study, there was no significant differences in favorability toward prohibiting flavored tobacco products by demographic characteristics other than tobacco use status and perceptions regarding e-cigarette ads, suggesting that public attitudes toward such regulation are similar across different populations. This might be because of increased societal awareness of the health consequences of tobacco product use in recent years. In the past few years, several mass media educational campaigns have been launched warning about the health consequences of tobacco use, including CDC's adult-oriented *Tips from Former Smokers* campaign (launched in 2012), as well as FDA's youth-oriented *The Real Cost Campaign* (launched in 2014).(Duke et al., 2015a; Duke et al., 2015b; McAfee et al., 2013; Neff et al., 2016) Evaluation studies have shown high public awareness of these federal campaigns, as well as a demonstrable effect on positive cognitive and cessation behaviors.(Duke et al., 2015a; Duke et al., 2015b; McAfee et al., 2013; Neff et al., 2016)

Variations in favorability were observed by perception regarding tobacco advertisement. Among both adults overall and current tobacco users, those who believed that tobacco industry marketing of novel tobacco products such as e-cigarettes might make children think about smoking were more likely to report favorability. In addition, among current tobacco product users, those who had any children aged < 18 years living in their household were significantly more likely to report favorability. Parents and guardians represent a large segment of the population for whom tobacco educational messaging framed around protection of children might resonate.(Lochbuehler et al., 2016) In its recently adopted Tobacco Products Directive, the European Commission implemented regulations (including a prohibition on flavors) focused mainly on tobacco products with the highest use among European youth, including manufactured cigarettes and RYO cigarettes.(European Commission, 2019; European Commission, 2016; European Commission, 2014) Similarly, efforts in the US to reduce the appeal of the most prevalent products among youth may be beneficial, including those focused on e-cigarettes, cigarettes, cigars, and hookahs.(US Food and Drug Administration, 2018; Wang et al., 2018) Opportunities also exist for state, local, and tribal governments to implement policies that can reduce access to flavored and other tobacco products among youth in addition to other comprehensive tobacco prevention and control efforts.(Tynan et al., 2016; Marynak et al., 2017; Tobacco Twenty-one, 2019; Public Health Law Center, 2017; Holmes et al., 2016) Several states and communities have adopted laws restricting sales of various flavored tobacco products, including New York City (New York), Chicago (Illinois), Providence (Rhode Island), and San Francisco (California).(Public Health Law Center, 2017)

This study is subject to at least three limitations. First, *Summer Styles* is a web-based panel survey and does not recruit using population-based probability samples. This might yield results with limited generalizability, particularly with panel conditioning (Yeager et al., 2011). Second, all measures were based on self-report, which could be subject to inaccuracies and biases. For example, there might be some misclassification in self-reported tobacco product use history (current, former, and never use) because detailed lifetime usage thresholds were not available. Specifically, the definition of former tobacco users grouped together persons who might only have experimented with cigarettes with more routine smokers. Finally, favorability could not be examined by flavor use status (whether respondents used a flavored tobacco products) due to lack of information.

## 5. Conclusion

This study found that nearly half of adults favored prohibiting all flavored tobacco products. Favorability was significantly higher among those with minors in their household, and those concerned about smoking initiation among children. Prohibiting flavored tobacco products could help reduce the appeal, initiation, and use of these products, particularly among youth people.

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## Contributors' statements

Dr. Agaku conceptualized and designed the study and drafted the initial manuscript. Ms. Odani helped conceptualize the study, assisted in the statistical analyses and critically reviewed and revised the manuscript. Dr. King conceptualize the study and critically reviewed and revised the manuscript.

All authors approve the final manuscript as submitted and agree to be accountable for all aspects of the work.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention.

## Declaration of competing interest

The authors have no conflicts of interest to disclose.

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