Original investigation

Flavors and Risk: Perceptions of Flavors in Little Cigars and Cigarillos Among U.S. Adults, 2015

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Abstract

Introduction: Flavored little cigars, cigarillos, and filtered cigars (LCCs) are popular and pose unique health risks. This study explored risk perceptions of flavors in LCCs and the relationship between perceptions and use among U.S. adults.

Methods: Data were from the 2015 Tobacco Products and Risk Perceptions Survey of a national probability sample of 6051 adults, conducted online, August–September, 2015. The analytic sample consisted of 5105 adults aware of LCCs and 2174 who had ever used any type of LCCs.

Results: Just over half of adults reported flavors in LCCs as “very” or “somewhat” risky, while more than one-third of adults reported they did not know the risks of flavors in LCCs. Younger adults, males, and users of any LCCs were more likely than older adults, females and non-users, respectively, to perceive LCC flavors as less risky. Those who perceived LCC flavors as “not at all risky” or “a little risky” were roughly twice as likely to have ever used flavored LCCs compared to those who reported not knowing the risks (AOR = 2.07, 95% CI = 1.16 to 3.69 and AOR = 1.96, 95% CI = 1.26 to 3.06). Those who reported LCC flavors as “very risky” were also more likely to have ever used flavored LCCs than those who reported not knowing the risks (AOR = 1.50, 95% CI = 1.13 to 1.98).

Conclusions: Though the proportion of adults assigning low risk to flavors in LCCs is small, these adults are more likely to use flavored LCCs. The association of use with risk perceptions of flavors in LCCs should be addressed in health risk campaigns.

Implications: Flavored LCCs are popular, particularly among young adults. While understanding the impact of flavors is an FDA research priority, little is currently known about perceptions of risk associated with flavors in LCCs. This study explores the nature of risk perceptions of flavors in LCCs, and the relationship between perceptions and flavored LCC use. We conclude that perception of risk of flavors in LCCs is related to use of these products, particularly perception of less risk. Considering the relationship between use and risk perceptions would be helpful in constructing health risk messaging.

Introduction

Although the Family Smoking Prevention and Tobacco Control Act (FSPTCA) of 2009 banned sales of non-menthol flavored cigarettes in the United States, it did not ban sales of other flavored tobacco

products, including little cigars, cigarillos, and filtered cigars (LCCs).¹

Subsequently, flavored non-cigarette tobacco products have experienced significant popularity, especially among youth^{2–5} and young adults.^{2,6} Many popular flavors are sweet, including fruit, candy, and dessert flavors, and are known to be especially appealing to youth.⁷

Flavors in non-cigarette tobacco products have been implicated as a leading reason for use among both youth⁴ and adults.⁸ Often, the first tobacco product used among youth is flavored.⁴ Additionally, previous research has shown an association between ever trying flavored tobacco products and current cigarette smoking among youth.⁹

A study of flavor additives in tobacco products revealed that many are the same as those used to flavor candies, and several are found in tobacco products at higher concentrations.¹⁰ It is currently unclear whether flavor additives have an effect on the toxicity of products containing them. Studies performed on the constituents of flavored liquids in electronic nicotine products have suggested that these may contain toxins, or substances that may become toxic under certain conditions of use, presenting an additional, currently unregulated hazard.^{11–14} There is also evidence that certain liquid flavorings, such as cinnamon,¹⁴ strawberry,¹³ and cherry,¹² or the use of these flavorings with their accompanying chemical additives, may be more toxic than others. Despite the suggestion of toxicity of e-liquid flavorings, few, if any, chemical studies have been done on flavorings found in LCCs. However, the concern that flavorings generally recognized as safe in food products may not be as safe for inhalation^{12,15} is equally valid for LCCs. Given the many LCC ingredients other than flavors already identified as harmful, or potentially harmful,^{16–18} it is unclear whether flavor additives could present any additional, significant harm. Still, the way in which these popular flavorings are perceived by users and potential users, and the relationship between these perceptions and use, are worthy of investigation. Understanding perceptions of risk of flavors in LCCs may aid understanding of the popularity of flavored vs. unflavored products, more broadly.

While attention has been paid to risk perceptions of some tobacco products, particularly cigarettes,^{19–21} and relationships between risk perceptions and intentions to use LCCs have been shown,²² comparatively few studies have examined risk perceptions of flavored products, or flavors themselves, specifically. Studies of youth have shown positive associations with flavor descriptors on packages of flavored cigarettes²³ and more positive expectancies of flavored cigarettes relative to unflavored cigarettes.²⁴ Research on perceptions of flavor additives in LCCs found that positive perceptions of certain flavors among adults were associated with flavored LCC use.²⁵ Perceptions of menthol flavoring as lower risk were shown to be associated with use of both menthol-flavored and non-menthol flavored tobacco products.^{25,26} Focus group data from youth and young adult users and susceptible non-users of non-cigarette tobacco products (including LCCs) indicated these groups tend to think positively about LCCs due to their flavors and to perceive LCCs generally to be less harmful than cigarettes.²⁷

Given the popularity of flavored LCCs, it is important to understand the risk perceptions held about flavors. Establishing the amount of risk consumers feel is posed by flavors in LCCs and assessing the possible connections between perceptions and usage will provide a deeper understanding of the groups most in need of information and interventions. This study seeks to address several of the current FDA/CTP research priorities²⁸ by answering the following questions: How do consumers perceive the risks of flavors in LCCs? Do these perceptions vary by participant characteristics, or by product use? Finally, are perceptions held about risks of flavors in LCCs associated with flavored LCC use?

Methods

Study Sample and Procedures

Data came from the 2015 Tobacco Products and Risk Perceptions Survey which is conducted by the Georgia State University Tobacco

Center of Regulatory Science (TCORS). This is an annual, cross-sectional survey of a probability sample drawn and representative oversample of pre-identified cigarette smokers from GfK's KnowledgePanel. Survey participants were selected with probabilities proportional to size (PPS) after application of the panel demographic post-stratification weight. The sample excluded anyone who completed the 2014 Tobacco Products and Risk Perceptions Survey. Recruited panelists who did not have internet access were provided a computer with internet access. Data collection occurred during August–September, 2015. Participants completed the survey in 25 min (median) and received a cash-equivalent of \$5 for their participation or \$10 if they had not completed the survey within the first 13 days of data collection. This study was approved by the Georgia State University Institutional Review Board, who granted a waiver of informed consent for this study.

In total, 8135 KnowledgePanel members were invited to participate in the survey: 7194 members from the general population sample, of which 76.4% completed the screener and 5497 qualified for the survey; and 941 members from the smoker augment sample, of which 72.6% completed the screener and 594 qualified for the main survey by confirming their current smoking status. Of the 6091 qualified completers, 40 cases were excluded due to refusing to answer more than half of the survey questions, yielding an analytic sample of 6051 cases. A final stage completion rate of 74.4% was obtained. The analytic sample for this study comprises the 5105 respondents who reported being aware of LCCs. A study-specific post-stratification weight was computed using an iterative proportional fitting (raking) procedure to adjust for survey non-response as well as for oversampling of smokers. Demographic and geographic distributions from the most recent Current Population Survey (CPS) were employed as benchmarks for adjustment, and included sex, age, race/ethnicity, education, household income, census region, metropolitan area, and internet access.

Measures

LCC Awareness and Use

Prior to answering any questions about LCCs, participants were shown a description of the products categorized as LCCs in this study. It read as follows: "Next, we'd like to ask about little cigars, cigarillos, and filtered cigars. These products go by lots of different names, so please use these descriptions and photos to understand what they are. Little cigars, cigarillos, and filtered cigars are smaller than traditional cigars. They are usually brown. Some are the same size as cigarettes, and some come with plastic or wood tips. Some common brands are Black & Mild, Swisher Sweets, Dutch Masters, Phillies Blunts, Prime Time, Winchester, and White Owl." To clarify further, this description was accompanied by images of small cigar products with and without plastic or wooden tips or filters. Awareness of LCCs was assessed by asking respondents if they had heard of any type of little cigars, cigarillos, or filtered cigars before taking the survey. Ever LCC use was assessed by asking respondents who were aware of LCCs if they had ever smoked any LCCs, even one or two puffs. Ever LCC smokers were then asked, "Do you now use little cigars, cigarillos, or filtered cigars every day, some days, rarely, or not at all?" Those who responded "every day," "some days" or "rarely" were considered current LCC smokers. An instruction was added to the beginning of the LCC questions to have respondents exclude use of LCCs with marijuana, as "blunts" from their focus. It was worded as follows: "As you answer the next set of questions on little cigars, cigarillos, and filtered cigars, please think ONLY about your use of these products without marijuana in them."

Flavored LCC Use

Ever LCC smokers who responded that they had ever smoked LCCs with flavors other than tobacco flavor were classified as ever flavored LCC smokers. Current flavored LCC smoking was assessed by asking current LCC smokers who reported using flavored LCCs in their lifetime, “In the past 30 days, were any of the little cigars, cigarillos, or filtered cigars you smoked flavored to taste like mint, wintergreen, menthol, fruit, coffee drinks, candy, desserts, spices, alcohol drinks, or any other non-tobacco flavor?”

Risk Perceptions of Flavors in LCCs

Risk perceptions of flavors in LCCs were assessed by asking participants, “Many little cigars, cigarillos, or filtered cigars are flavored. In your opinion, the use of these flavors in little cigars, cigarillos, or filtered cigars is...” with response options including “not at all risky to one’s health”, “a little risky to one’s health”, “somewhat risky to one’s health”, “very risk to one’s health”, and “don’t know.”

Participant Characteristics and Cigarette Smoking Status

Participant characteristics included sex, age, race/ethnicity, education, perceived physical health, and sexual orientation and were obtained from profile surveys administered by GfK to KnowledgePanel panelists. Age was divided into seven categories, allowing for young adults, ages 18–24 to be analyzed separately. Participants indicated their race/ethnicity as one of the following: “White, Non-Hispanic,”

“Black, Non-Hispanic,” “Other, Non-Hispanic,” “Hispanic,” or “Two or more races, Non-Hispanic.” The categories “Two or more races, Non-Hispanic” and “Other, Non-Hispanic” were combined into one category for greater statistical power. Respondents who reported smoking at least 100 cigarettes in their lifetime were asked, “Do you currently smoke cigarettes every day, some days, or not at all?” Those who responded “every day” or “some days” were considered current smokers, while those who responded “not at all” were considered former smokers. Those who reported that they had not smoked at least 100 cigarettes in their lifetime were considered never smokers.

Statistical Analysis

Analyses were conducted in October–November, 2016 using IBM SPSS with Complex Samples module (v.21) (Armonk, NY) to obtain weighted point estimates and 95% confidence intervals for risk perceptions of flavors in LCCs, and flavored LCC use overall and by participant characteristics and product use. Associations among variables were measured by weighted multivariable logistic regression and Rao-Scott chi-square tests.

Results

Table 1 displays the distribution of risk perceptions of flavors in LCCs, overall and by participant characteristics. More than half of

Table 1. Risk perceptions of LCC flavors by participant characteristics, among U.S. adults aware of LCCs

Characteristics	<i>n</i>	Not at all risky % (95% CI)	A little risky % (95% CI)	Somewhat risky % (95% CI)	Very risky % (95% CI)	Don't know % (95% CI)
Overall:	5105	3.3 (2.7 to 3.9)	6.8 (6.0 to 7.8)	16.6 (15.3 to 18.0)	36.4 (34.8 to 38.1)	36.9 (35.2 to 38.6)
<i>Sex***</i>						
Male	2649	3.8 (3.0 to 4.9)	8.2 (7.0 to 9.6)	18.4 (16.6 to 20.4)	33.1 (30.9 to 35.4)	36.4 (34.1 to 38.8)
Female	2456	2.7 (2.0 to 3.6)	5.4 (4.3 to 6.7)	14.7 (13.0 to 16.7)	39.8 (37.4 to 42.4)	37.3 (34.9 to 39.8)
<i>Age***</i>						
18–24	281	4.8 (2.4 to 9.4)	11.6 (7.6 to 17.3)	22.3 (16.5 to 29.3)	32.8 (26.5 to 39.8)	28.6 (22.5 to 35.6)
25–34	935	4.0 (2.8 to 5.7)	9.5 (7.7 to 11.8)	22.4 (19.2 to 25.9)	33.6 (29.9 to 37.6)	30.4 (26.9 to 34.2)
35–44	748	5.2 (3.4 to 7.7)	6.3 (4.6 to 8.5)	18.7 (15.5 to 22.4)	31.9 (28.0 to 36.2)	37.9 (33.7 to 42.3)
45–54	810	2.0 (1.2 to 3.3)	6.2 (4.5 to 8.6)	14.8 (11.9 to 18.3)	41.7 (37.4 to 46.1)	35.2 (31.2 to 39.5)
55–64	1097	2.5 (1.6 to 3.7)	6.5 (4.6 to 9.1)	12.8 (10.6 to 15.4)	37.5 (33.9 to 41.3)	40.7 (37.0 to 44.6)
65–74	877	2.6 (1.5 to 4.4)	3.2 (2.2 to 4.5)	11.9 (9.5 to 14.9)	39.8 (35.7 to 43.9)	42.6 (38.5 to 46.8)
75+	357	1.0 (0.4 to 2.5)	2.8 (1.4 to 5.4)	11.0 (7.6 to 15.5)	37.9 (31.5 to 44.7)	47.4 (40.7 to 54.2)
<i>Race/Ethnicity</i>						
White, NH	3838	3.4 (2.7 to 4.3)	7.5 (6.5 to 8.7)	16.3 (14.8 to 17.9)	35.6 (33.7 to 37.5)	37.2 (35.3 to 39.1)
Black, NH	425	2.0 (1.0 to 3.6)	4.1 (2.4 to 6.9)	14.7 (11.0 to 19.4)	39.5 (34.0 to 45.4)	39.7 (34.1 to 45.6)
Hispanic	565	3.9 (2.5 to 6.1)	4.5 (2.9 to 7.0)	19.6 (15.9 to 23.9)	37.8 (33.1 to 42.6)	34.2 (29.5 to 39.2)
Other, NH	277	2.3 (0.9 to 6.0)	9.4 (5.4 to 15.6)	16.3 (10.7 to 24.1)	37.1 (29.5 to 45.5)	34.9 (27.3 to 43.4)
<i>Education*</i>						
Less than HS	291	3.7 (1.6 to 8.3)	8.2 (5.2 to 12.8)	18.4 (13.2 to 25.2)	34.7 (28.2 to 41.7)	35.0 (28.6 to 41.9)
HS	1680	2.3 (1.5 to 3.4)	4.8 (3.7 to 6.2)	15.0 (12.9 to 17.4)	38.2 (35.4 to 41.2)	39.7 (36.8 to 42.7)
Some college	1361	2.8 (1.9 to 4.1)	6.9 (5.3 to 9.0)	16.3 (14.0 to 19.0)	38.8 (35.5 to 42.2)	35.1 (31.9 to 38.5)
College degree +	1773	4.5 (3.5 to 5.7)	8.2 (6.8 to 9.8)	17.8 (15.7 to 20.1)	33.0 (30.5 to 35.7)	36.6 (33.8 to 39.4)
<i>Physical Health</i>						
Excellent or very good	2306	3.8 (3.0 to 4.9)	7.1 (5.9 to 8.5)	16.7 (14.8 to 18.9)	37.7 (35.2 to 40.2)	34.6 (32.2 to 37.1)
Good	1979	2.7 (1.9 to 3.8)	6.9 (5.6 to 8.5)	17.3 (15.2 to 19.6)	34.8 (32.1 to 37.6)	38.3 (35.5 to 41.1)
Fair or poor	804	2.5 (1.6 to 4.0)	5.9 (4.0 to 8.6)	14.6 (11.8 to 17.9)	37.1 (32.9 to 41.6)	39.9 (35.6 to 44.4)
<i>Sexual Orientation</i>						
Heterosexual	4663	3.2 (2.6 to 3.9)	6.8 (5.9 to 7.7)	16.3 (15.0 to 17.8)	36.7 (34.9 to 38.4)	37.0 (35.3 to 38.8)
Non-Heterosexual	302	4.1 (2.0 to 8.5)	7.5 (4.4 to 12.7)	23.1 (17.3 to 30.1)	34.0 (26.9 to 41.9)	31.2 (24.9 to 38.4)

p is based on weighted bivariate tests of association (χ^2) **p* < .05, ***p* < .01, ****p* < .001; LCCs = Little cigars, cigarillos, or filtered cigars; CI = Confidence Interval; NH = non-Hispanic; HS = high school.

participants perceived flavors in LCCs to be either “very risky” or “somewhat risky,” while a much smaller percentage perceived flavors in LCCs to be “not at all risky” or “a little risky”. More than one-third of participants did not know the risks. There were significant differences in risk perceptions by sex, age, and education. Results of multivariable multinomial logistic regression are displayed in Table 2. Males were more likely than females to report LCC flavors as “not at all risky”, “a little risky”, or “somewhat risky” than “very risky.” In addition, younger adults were more likely than older adults to report LCC flavors as “not at all risky”, “a little risky”, or “somewhat risky” than “very risky.” Hispanic and Black respondents were less likely than White respondents to report LCC flavors as “a little risky” compared with “very risky.” Table 3 shows the distribution of risk perceptions of flavors in LCCs by cigarette smoking status and use of LCCs. Risk perceptions of LCC flavors varied significantly by cigarette smoking status, ever and current LCC use, and ever use of flavored LCCs. Ever and current LCC users and ever users of flavored LCCs were more likely to perceive flavors in LCCs to be less risky than their non-using counterparts.

Table 4 shows that overall, nearly half of ever LCC smokers have smoked flavored LCCs. In addition (data not shown), three-quarters of current LCC users who have ever used flavors currently use flavored LCCs (75.1%, 95% CI = 65.2 to 82.9). Examination of use of flavored LCCs by perception of risk shows that six out of ten of those who consider flavors in LCCs to be “not at all risky” have used flavored LCCs, compared with fewer than half of those

who consider LCCs to be “very risky,” and fewer still of those who said they didn’t know the level of risk. Multivariable logistic regression adjusting for sex, age, race/ethnicity, education, physical health, sexual orientation, cigarette smoking status, and current LCC use indicated that those who perceived LCC flavors to be “not at all risky”, “a little risky” or “very risky” were significantly more likely to have ever used flavored LCCs than those who reported that they did not know the extent of risk. Furthermore, some groups of ever LCC users had greater odds of ever using flavored LCCs: younger adults; those with some college education as compared with those with college degrees; former cigarette smokers as compared with never smokers; and those who currently smoke any LCCs rarely or some days as compared with those who currently don’t smoke LCCs at all. Compared with adults with “fair/poor” perceived physical health, those who perceived their health as “excellent/very good” or “good” were less likely to have smoked flavored LCCs.

Discussion

This study explored risk perceptions of flavors in LCCs and the relationship between risk perceptions and use of flavored LCCs. Our focus on flavors in LCCs, rather than on flavored LCCs in their entirety, allowed for isolating perceptions of risk related to the product flavors, instead of to the entire product. While we know that flavored tobacco products are popular,²⁻⁶ and that consumers hold favorable impressions of flavored products,²³ it has been unclear

Table 2. Factors associated with risk perceptions of LCC flavors, among U.S. adults aware of LCCs

Characteristics	Not at all risky AOR ^a (95% CI)	A little risky AOR (95% CI)	Somewhat risky AOR (95% CI)	Don't know AOR (95% CI)
Sex				
Male	1.67 (1.08 to 2.57)*	1.77 (1.29 to 2.44)***	1.48 (1.18 to 1.85)**	1.16 (0.98 to 1.39)
Female	REF	REF	REF	REF
Age				
18–24	7.21 (2.08 to 25.00)**	5.53 (2.20 to 13.93)***	2.86 (1.53 to 5.33)**	0.76 (0.47 to 1.24)
25–34	4.67 (1.58 to 13.83)**	4.26 (1.94 to 9.33)***	2.66 (1.61 to 4.40)***	0.75 (0.52 to 1.09)
35–44	6.85 (2.33 to 20.14)***	2.70 (1.18 to 6.18)*	2.32 (1.38 to 3.91)**	0.95 (0.65 to 1.39)
45–54	2.21 (0.73 to 6.64)	2.19 (0.97 to 4.97)	1.40 (0.83 to 2.35)	0.68 (0.47 to 0.99)*
55–64	2.94 (1.01 to 8.53)*	2.55 (1.12 to 5.82)*	1.40 (0.84 to 2.30)	0.88 (0.62 to 1.25)
65–74	2.26 (0.77 to 6.67)	1.19 (0.52 to 2.71)	1.24 (0.74 to 2.09)	0.91 (0.64 to 1.31)
75+	REF	REF	REF	REF
Race/Ethnicity				
White, NH	REF	REF	REF	REF
Black, NH	0.47 (0.22 to 1.01)	0.45 (0.25 to 0.83)*	0.74 (0.50 to 1.09)	1.03 (0.77 to 1.38)
Hispanic	0.83 (0.46 to 1.49)	0.50 (0.30 to 0.84)**	0.96 (0.70 to 1.31)	0.90 (0.69 to 1.18)
Other, NH	0.50 (0.18 to 1.42)	0.88 (0.44 to 1.76)	0.76 (0.43 to 1.34)	0.91 (0.60 to 1.37)
Education				
Less than HS	0.79 (0.30 to 2.09)	1.01 (0.53 to 1.91)	1.05 (0.63 to 1.74)	0.86 (0.58 to 1.25)
HS	0.64 (0.36 to 1.12)	0.68 (0.45 to 1.03)	0.94 (0.71 to 1.24)	0.93 (0.75 to 1.16)
Some college	0.58 (0.35 to 0.97)*	0.78 (0.52 to 1.17)	0.81 (0.61 to 1.06)	0.79 (0.64 to 0.98)*
College degree +	REF	REF	REF	REF
Physical Health				
Excellent or very good	1.06 (0.56 to 1.98)	0.99 (0.60 to 1.63)	0.94 (0.67 to 1.31)	0.83 (0.65 to 1.07)
Good	0.91 (0.49 to 1.72)	1.16 (0.70 to 1.93)	1.13 (0.82 to 1.58)	1.01 (0.79 to 1.30)
Fair or poor	REF	REF	REF	REF
Sexual Orientation				
Heterosexual	1.15 (0.56 to 2.36)	0.96 (0.50 to 1.83)	0.73 (0.47 to 1.13)	1.07 (0.72 to 1.59)
Non-Heterosexual	REF	REF	REF	REF

The reference category for the outcome variable was “very risky”; ^aOR adjusted for sex, age, race/ethnicity, education, physical health and sexual orientation; Boldface indicates statistical significance (* $p < .05$, ** $p < .01$, *** $p < .001$); LCCs = Little cigars, cigarillos, or filtered cigars; NH = non-Hispanic; HS = high school; REF = Reference category.

Table 3. Risk perceptions of flavors in LCCs by product use, among U.S. adults aware of LCCs

Product use	<i>n</i>	Not at all risky % (95% CI)	A little risky % (95% CI)	Somewhat risky % (95% CI)	Very risky % (95% CI)	Don't know % (95% CI)
<i>Cigarette smoking status**</i>						
Current smoker	1159	4.0 (2.7 to 5.9)	9.2 (6.8 to 12.3)	20.9 (17.6 to 24.7)	28.0 (24.4 to 31.9)	37.9 (34.0 to 42.0)
Former smoker	1529	2.7 (1.9 to 3.8)	5.8 (4.4 to 7.7)	13.8 (11.7 to 16.3)	40.0 (37.0 to 43.0)	37.7 (34.7 to 40.7)
Never smoker	2417	3.4 (2.6 to 4.4)	6.7 (5.7 to 7.9)	16.9 (15.2 to 18.9)	36.8 (34.5 to 39.2)	36.2 (33.8 to 38.6)
<i>Ever LCC use***</i>						
Yes	2174	5.2 (4.1 to 6.5)	9.2 (7.6 to 11.0)	19.0 (17.0 to 21.2)	32.3 (29.8 to 34.9)	34.3 (31.8 to 36.9)
No	2931	2.0 (1.5 to 2.7)	5.3 (4.4 to 6.3)	15.0 (13.4 to 16.8)	39.1 (36.9 to 41.4)	38.6 (36.3 to 40.9)
<i>Current LCC use***a</i>						
Yes	475	8.3 (5.6 to 12.2)	15.0 (10.9 to 20.4)	25.3 (20.3 to 31.0)	20.9 (16.2 to 26.5)	30.5 (25.1 to 36.4)
No	4628	2.8 (2.2 to 3.5)	6.0 (5.2 to 7.0)	15.7 (14.4 to 17.1)	37.9 (36.2 to 39.7)	37.5 (35.8 to 39.3)
<i>Ever flavored LCC use***b</i>						
Yes	917	6.9 (5.1 to 9.3)	12.0 (9.3 to 15.5)	20.3 (17.3 to 23.8)	32.7 (28.9 to 36.7)	28.0 (24.4 to 31.9)
No	1257	3.7 (2.5 to 5.5)	6.8 (5.3 to 8.7)	18.0 (15.4 to 20.9)	32.0 (28.8 to 35.4)	39.5 (36.2 to 42.9)
<i>Current flavored LCC use^c</i>						
Yes	114	9.7 (4.1 to 21.2)	16.9 (9.0 to 29.4)	22.7 (15.0 to 32.9)	23.7 (14.4 to 36.5)	27.0 (17.1 to 39.9)
No	42	6.7 (1.5 to 25.1)	10.3 (4.2 to 23.1)	24.5 (12.0 to 43.5)	24.7 (10.0 to 49.3)	33.7 (17.8 to 54.4)

^aCurrently use LCCs every day, some days, or rarely; ^bAmong ever LCC users; ^cPast 30-day use among current LCC users who have ever used flavors; *p* is based on weighted bivariate tests of association (χ^2) **p* < .05, ***p* < .01, ****p* < .001; LCCs = Little cigars, cigarillos, or filtered cigars; CI = Confidence Interval.

whether consumers feel that flavors may add any additional health risks to these products.

When asked specifically about flavors in LCCs, more than half of respondents in this study perceived flavors in LCCs to be “very risky” or “somewhat risky”, while only a small proportion perceived flavors in LCCs to be “not at all” or “a little risky” to one’s health. Over one-third reported that they did not know the level of risk of flavors in LCCs. These results indicate both that lack of awareness of any risks of flavors is common and that many other consumers may be wary of flavor additives in these products. Previous research has shown consumers are more worried about the harms of smoking cigarettes from chemicals that are added to cigarette tobacco than from those chemicals naturally occurring in cigarette smoke,²⁹ so some may perceive flavor additives as riskier for this reason. In examining the association between risk perceptions of flavors in LCCs and flavored LCC use, this study found that those who perceived flavors in LCCs to be of lower risk were more likely to have ever used flavored LCCs. This finding is not surprising and supports related research linking low perceptions of risk with cigarette smoking.³⁰

In addition, those who reported having any sense of the risks—whether they perceived higher or lower risk—were more likely to have ever used flavored LCCs than those who did not know the risks. This held true after controlling for socio-demographic characteristics and other correlates of use. While it seems logical that those who perceive lower risk of flavors in LCCs would be more likely to engage in use of flavored LCCs, it is less clear why those who perceive higher risk of flavors are more likely to use these products than those who do not know the risks. There are several conceivable explanations. First, it is possible that the various ways in which LCCs are smoked—less regularly than cigarettes, not consuming an entire LCC in one session, removing the inner liner, or removing the tobacco and replacing it with marijuana³¹—are seen as mitigating the health risks. A second possibility is that the nature and quantity of information that exists about the risks of flavors are insufficient deterrents to use. Third, similar to cigarette smokers, users of flavored LCCs may be aware that health risks exist, but the perceived benefits of use, addiction to the products, or their optimism about their own risks relative to others’ may override the rationally

observed risks, contributing to use.^{21,32,33} Prior research has shown that affect, the feelings and emotions associated with a product (flavored LCCs) or activity (smoking flavored LCCs), may be crucial to the development of risk perceptions and may impact behavior.^{32,34} In some cases, affect may be a more important motivator of use than cognitive risk perceptions.^{32,34} Thus, future research should investigate the role of affect, or the feelings associated with flavors in LCCs, in both risk perceptions of flavors and use of flavored LCCs.

In this sample, users of any LCCs and young adults were more likely than non-users and older adults to believe that flavors in LCCs were lower risk. LCC users may both use flavored products because of lower perceived risk of flavors and perceive lower risk due to positive experiences with these products. As those most likely to use flavored LCCs, young adults are particularly in need of messages that illuminate any health risks of these products they may be minimizing. Our data also suggest that males are more likely than females, and White respondents are more likely than Black and Hispanic respondents, to perceive lower risk of flavors in LCCs. This is suggestive of the “White male effect,” whereby White males are more likely to perceive lower risk of activities generally, as a result of their differential societal role and differences in cultural world views.³⁵ Future research should assess other social, cultural, or political attributes that may contribute to risk perceptions of tobacco flavorings and use of these products.

This study additionally showed that nearly half of adults who have ever smoked any LCCs have ever used flavored LCCs. Moreover, among current users of any LCCs, three-quarters are current flavored LCC users. Socio-demographic characteristics associated with flavored LCC use in this study are mainly consistent with previous findings.³⁶

Limitations

This study has several limitations. First, it is subject to inherent limitations of cross-sectional data. Second, it contained both comparatively small samples of respondents of color and of current flavored LCC users. Thus, lack of significant differences among these populations may be attributable to suboptimal statistical power. Third, in assessing risk perceptions, the inclusion of an explicit “don’t know”

Table 4. Association between risk perceptions of flavors and flavored LCC use, among ever LCC users^a

Perceptions and characteristics	Ever used flavored LCCs	
	% (95% CI)	AOR ^b (95% CI)
Overall:	45.3 (42.6 to 48.0)	
<i>Perception of Risk of Flavors in LCCs</i>	***	
Not at all risky	60.5 (48.0 to 71.8)	2.07 (1.16 to 3.69)*
A little risky	59.4 (50.0 to 68.1)	1.96 (1.26 to 3.06)**
Somewhat risky	48.4 (42.3 to 54.5)	1.32 (0.94 to 1.86)
Very risky	45.9 (41.1 to 50.7)	1.50 (1.13 to 1.98)**
Don't know	37.0 (32.7 to 41.6)	REF
<i>Sex</i>	***	
Male	41.5 (38.2 to 44.8)	REF
Female	52.9 (48.1 to 57.6)	1.28 (0.99 to 1.66)
<i>Age</i>	***	
18–24	69.7 (57.8 to 79.5)	10.56 (4.75 to 23.47)***
25–34	61.4 (55.9 to 66.7)	9.78 (5.33 to 17.96)***
35–44	48.2 (41.8 to 54.7)	5.60 (3.02 to 10.40)***
45–54	37.0 (30.2 to 44.2)	3.20 (1.70 to 6.00)***
55–64	39.1 (33.2 to 45.4)	3.84 (2.12 to 6.95)***
65–74	24.2 (18.9 to 30.4)	1.91 (1.02 to 3.57)*
75+	13.7 (8.7 to 21.1)	REF
<i>Race/Ethnicity</i>	**	
White, NH	42.0 (38.9 to 45.1)	REF
Black, NH	51.5 (42.4 to 60.5)	0.96 (0.62 to 1.50)
Hispanic	56.7 (49.3 to 63.8)	1.33 (0.93 to 1.90)
Other, NH	41.3 (29.7 to 54.0)	0.75 (0.44 to 1.26)
<i>Education</i>	**	
Less than HS	58.1 (47.1 to 68.3)	1.42 (0.80 to 2.52)
HS	44.8 (39.7 to 50.1)	1.38 (0.99 to 1.94)
Some college	48.8 (44.1 to 53.5)	1.40 (1.05 to 1.86)*
College degree +	37.8 (33.7 to 42.1)	REF
<i>Physical Health</i>	*	
Excellent or very good	46.4 (42.4 to 50.4)	0.68 (0.48 to 0.95)*
Good	41.5 (37.3 to 45.9)	0.53 (0.38 to 0.75)***
Fair or poor	51.9 (45.2 to 58.4)	REF
<i>Sexual Orientation</i>		
Heterosexual	44.9 (42.1 to 47.7)	1.26 (0.79 to 2.00)
Non-Heterosexual	48.1 (37.5 to 59.0)	REF
<i>Cigarette smoking status</i>	**	
Current smoker	54.2 (48.9 to 59.4)	1.23 (0.88 to 1.71)
Former smoker	41.4 (37.2 to 45.6)	1.40 (1.04 to 1.88)*
Never smoker	43.5 (38.9 to 48.3)	REF
<i>Current LCC use</i>	***	
Not at all	39.8 (36.9 to 42.8)	REF
Rarely	60.8 (53.8 to 67.4)	1.88 (1.33 to 2.67)***
Some Days	70.8 (56.9 to 81.6)	2.79 (1.34 to 5.79)**
Every day	70.1 (51.1 to 84.0)	1.64 (0.72 to 3.73)

^a*n* = 2174; ^bOR adjusted for sex, age, race/ethnicity, education, physical health, sexual orientation, cigarette smoking status, and current LCC use; Boldface indicates statistical significance (**p* < .05, ***p* < .01, ****p* < .001); LCCs = Little cigars, cigarillos, or filtered cigars; NH = non-Hispanic; HS = high school; REF = Reference category.

option may have led to a significantly higher proportion of “don’t know” responses than a study in which “don’t know” was not provided, but still accepted as a legitimate response. In addition, while our study included an instruction to participants to exclude thinking about use of LCCs as “blunts” when answering survey questions, it did not analyze users of “blunts” separately from other users. “Blunts-only” users may perceive risks of flavors or of all LCCs differently. Also, our survey included only one item to assess respondents’ risk perceptions of flavors in LCCs. Additional items, such as those asking for risk perceptions of other chemicals in LCCs, may have provided more context.

Conclusions

Given the popularity of flavored LCCs, the potential for adverse health effects is significant. This study reveals that many adults think flavors in LCCs carry health risks, while a substantial number don’t know whether flavors are risky or not. Importantly, those who perceive less risk of flavors in LCCs, including younger adults, males, and users of any type of LCCs, are more likely to use these flavored products. Thus, considering the relationship between risk perceptions and use could benefit messaging campaigns. Future research and interventions may find it beneficial to assess the potential impact

of other critical factors such as emotions or attitudes on flavored LCC risk perceptions.

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