

Original investigation

Risk Perceptions of Little Cigar and Cigarillo Smoking Among Adult Current Cigarette Smokers

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Abstract

Introduction: Few studies have examined the perceptions of risk of little cigar and cigarillo (LCC) smoking among cigarette smokers, which is important for expanding regulatory policies and developing prevention programs. We examined current cigarette smokers' perceived harm of LCC smoking, and determined whether these perceptions were associated with susceptibility and intention to continue smoking LCCs.

Methods: Data were from the 2014 Tobacco Products and Risk Perceptions Survey of a probability sample of 5717 US adults. Data were analyzed for a subsample of 1191 current cigarette smokers who were stratified into three groups: (1) dual current cigarette smokers who had ever used LCCs, (2) current smokers susceptible to LCC smoking, and (3) current smokers who were not susceptible to LCC smoking.

Results: Overall, 47.2% of participants were dual smokers, 12.7% were susceptible to LCC smoking, and 40.1% were not susceptible. Perceptions of risk of LCCs varied across the groups. Dual smokers were more likely to perceive that daily LCC smoking is "very risky" ($OR = 1.64$, 95% CI = 1.08, 2.41) while occasional LCC smoking is only "somewhat risky" ($OR = 1.71$, 95% CI = 1.02, 2.87). Of the dual smokers, 20.7% intended to continue smoking LCCs in the future. Perceptions of addiction and risk of daily LCC smoking significantly predicted intention to continue LCC smoking. Addiction perceptions also significantly predicted susceptibility to initiate LCC smoking.

Conclusions: Perceptions about harms from and addiction to LCCs could predict future LCC smoking. Health communication campaigns need to address the harms of LCCs.

Implications: Our data suggest that perceptions of risk about the addictiveness of LCCs and frequency of use are important determinants of the LCC smoking susceptibility among some cigarette smokers and intended continued use among cigarette smokers with a history of LCC use. Health communication campaigns should address misperceptions related to LCCs.

Introduction

As cigarette smoking continues to decline, use of other combustible tobacco products among adults is increasing.¹ Little cigars and

cigarillos (LCCs) are cigarette-like products that are often flavored,² heavily marketed, and are inexpensive alternatives to cigarettes.³ LCCs are often used concurrently with cigarettes or other tobacco products.⁴⁻⁶ According to the 2012–2013 National Adult Tobacco

Survey (NATS), 18.4% of adult cigar users reported smoking little filtered cigars as their usual type smoked, while 61.8% reported smoking cigarillos. Nearly 60% of these adult cigar smokers were also current or former cigarette smokers.⁷ Though reasons for LCC use are not well documented, some adult smokers may dual use LCCs to either quit smoking or to complement or substitute for cigarette use.⁸ Regardless, dual use of cigarettes and LCCs may prolong smoking, perpetuate nicotine addiction, and lead to detrimental health effects on users, particularly if use is sustained over a long period of time.

The Family Smoking Prevention and Tobacco Control Act (FSPTCA) of 2009 provided the Food and Drug Administration (FDA) with the authority to regulate the manufacturing, distribution, and marketing of cigarettes. In May 2016, the FDA announced that it would extend its regulatory authority to include LCCs and other tobacco products. Though bringing LCCs under the regulatory authority of the FDA is a critical step to protect the public's health, it is important to note that LCCs are not as strictly regulated as cigarettes. Unlike cigarettes, LCCs are available in characterizing flavors, such as vanilla and blueberry. Flavor additives in tobacco products are known to appeal to smokers, and a substantial proportion of adult smokers report flavored cigar use. King and colleagues found that among adult cigar smokers aged 18 and older who completed the 2009–2010 NATS, 42.9% reported flavored cigar use. The prevalence of flavored cigar use was greater among females, those younger in age, Hispanics, and Other, non-Hispanics.⁹ The less-regulated status of LCCs may unintentionally fuel inaccurate perceptions about the relative harm of LCCs compared to cigarettes, especially among vulnerable populations such as young adults and some racial/ethnic minority groups.

Cigarette smokers are aware that their smoking causes some amount of harm.¹⁰ However, recent studies have found that some adult smokers perceive the health risks of LCC smoking to be minimal, noting that any cigar use (including LCCs) is less harmful than cigarette smoking.^{11–14} In addition to the availability flavor additives in LCC tobacco, widespread product advertising may also contribute to these misperceptions. The text, imagery, and color of LCC advertisements and packaging are designed to convey the sense of a lighter and perhaps healthier product than cigarettes.^{15–17} Adults may endorse the perceived safety of LCCs because, unlike cigarettes, they are not addressed in anti-smoking media campaigns.^{18–20} Further, infrequent non-daily use^{14,21} and misperceptions about the constituents of LCCs, such as the belief that LCCs have “natural” or fewer harmful ingredients^{18,20,21} compared to cigarettes, may also underscore these perceptions of reduced risk.

Despite well-established associations between risk perceptions and smoking behavior,²² few have examined the perceptions of risk of LCC smoking among adult cigarette smokers. The current study sought to understand adult current cigarette smokers' perceptions of harm related to LCC smoking. We also assessed LCC smoking behavior outcomes, including LCC smoking experimentation (ever use), susceptibility to LCC use, and intention to continue using LCCs, among our respondents. The association among perceptions of risk and the outcomes susceptibility to use and intention to continue smoking LCCs were also assessed. Understanding cigarette smokers' perceptions of risk and its association with LCC smoking behaviors will contribute to the body of evidence that can be used to expand future FDA regulatory policies related to LCCs. Study data can also contribute to the development of programs, including health communication campaigns that seek to curtail LCC use among cigarette smokers.

Methods

Study Overview and Participants

Data for the current study come from a larger study conducted by the Georgia State University Tobacco Center of Regulatory Sciences (TCORS) that seeks to understand consumers' perceptions of risk about novel and alternative tobacco products. In 2014, the parent study administered a cross-sectional survey, the Tobacco Products and Perceptions Survey, to a probability web-based sample of non-institutionalized US adults, aged 18 and older. The sample was drawn from GfK's KnowledgePanel, an online research panel, and included a representative oversample of cigarette smokers. We invited 7991 KnowledgePanel members to participate in the survey. Of those, 5833 completed the survey; 116 respondents were excluded because they did not complete more than 50% of the survey items. A total of 5717 respondents were retained for analyses. Additional details about the parent study can be found elsewhere.²³ This study was approved by the Institutional Review Board of Georgia State University.

Measures

Measures assessed in the current study included respondents' sociodemographic characteristics, cigarette and LCC smoking status, and perceptions of risks about LCC use. Sociodemographic characteristics assessed included sex, age, race/ethnicity, education, annual household income, and employment status. Cigarette smoking status was assessed with two items: lifetime smoking of at least 100 cigarettes (response options: yes/no) and currently smoking cigarettes “every day,” “some days,” or “not at all.” Respondents who reported smoking at least 100 cigarettes in their lifetime and smoked cigarettes “every day” or “some days” were classified as current cigarette smokers. Current cigarette smokers were asked about their LCC smoking status. LCC smoking status was assessed by asking respondents about ever use of LCCs (response options: yes/no). Brand names and product images were included with a definition of LCCs to assist respondents with product recognition. Current cigarette smokers who reported ever trying a LCC were asked about their intention to smoke LCCs again in the future. Intention to smoke LCCs in the future was assessed by the following question: “Which of the following best describes your thoughts on smoking little cigars or cigarillos in the future?” Response options included “probably won't smoke LCCs again,” “probably will smoke LCCs for a short time”; “probably will smoke LCCs for a long time”; and “don't know.” Current cigarette smokers who had never tried smoking a LCC were asked about their susceptibility to use LCCs. Susceptibility to use LCCs was assessed with the following question: “How likely are you to try smoking little cigars or cigarillos in the next year?” (response options: “very unlikely” to “very likely”). Current cigarette smokers who said they would “very likely” try LCCs were defined as LCC-susceptible cigarette smokers, while those who said “very unlikely” were defined as non-LCC-susceptible cigarette smokers. Perception of risk of LCC use was assessed by asking respondents about the likelihood of becoming addicted to LCCs (response options: “yes,” “no,” “don't know”); the harmfulness of smoking LCCs compared to cigarette smoking (response options: “less harmful,” “more harmful,” “about the same harm,” and “don't know”); risk of smoking LCCs daily (response options: “very risky” to “not risky at all,” and “don't know”); and risk of smoking LCCs occasionally (response options: “very risky” to “not risky at all,” and “don't know”).

Analytic Sample

Of the 5717 respondents, 1349 were current cigarette smokers; 158 respondents did not provide data on their LCC smoking status and were excluded from the analyses. Data from the 158 respondents were missing at random and did not influence study results. A total of 1191 current cigarette smokers were stratified into three groups: (1) dual current cigarette smokers who had ever smoked LCCs (Group 1); (2) LCC-susceptible cigarette smokers (Group 2); and (3) non-LCC-susceptible cigarette smokers (Group 3). Ever LCC smoking (instead of current smoking) was used to define dual use, as the sample size for current (past 30-day) LCC smokers was too small ($n = 92$) to produce reliable estimates. Of 1191 respondents, 49.1% ($n = 584$) were dual cigarette and ever LCC smokers, 9.8% ($n = 117$) were LCC-susceptible cigarette smokers, and 41.1% ($n = 490$) were non-LCC-susceptible cigarette smokers.

Analyses

Weighted descriptive and inferential statistics were conducted using Stata 14.0. Descriptive statistics were used to describe the sociodemographic characteristics of the 1191 cigarette smoking respondents. Multinomial logistic regression analyses were conducted to compare the sociodemographic factors and risk perception items among the three subgroups. Multinomial logistic regression analyses were also conducted to examine the association among the risk perception items and intention to smoke LCCs in the future among dual smokers (Group 1). Finally, multivariate logistic regression analyses were conducted to examine the association among the risk perception items and susceptibility to use LCCs among cigarette smokers who did not have a history of LCC use (Groups 2 and 3 combined). All multinomial and multivariate models were controlled for sociodemographic factors to produce adjusted relative risk ratios (RRR).

Results

Sociodemographic Characteristics of the Total Sample and Smoking Status Subgroups

Respondents' sociodemographic and smoking characteristics are presented in [Table 1](#). Overall, the majority of respondents were white, male, and aged 45–59 years old. [Table 1](#) also presents the results of the multinomial logistic regression analyses that compared the sociodemographic factors between dual smokers and non-LCC-susceptible cigarette smokers (Group 1 vs. Group 3) and LCC-susceptible smokers and non-LCC-susceptible cigarette smokers (Group 2 vs. Group 3). Compared to males, female cigarette smokers had lower odds of dual smoking (Group 1) than non-LCC-susceptible cigarette smoking (Group 3). Compared to adults aged 18–29 years old, cigarette smoking adults aged 45–59 years old and those age 60 years and older had lower odds of dual smoking (Group 1) than non-LCC-susceptible cigarette smoking (Group 3).

Compared to adults aged 18–29 years old, adults aged 45–59 years old also had lower odds of LCC-susceptible smoking (Group 2) than non-LCC-susceptible smoking (Group 3). Compared to white, non-Hispanics, black, non-Hispanics, and other, non-Hispanics had greater odds of LCC-susceptible cigarette smoking (Group 2) than non-LCC-susceptible cigarette smoking (Group 3).

Perceptions of Risk of LCCs by Smoking Status Subgroups

As shown in [Table 2](#), the majority of the 1191 respondents believed that LCCs were addictive. Over half of the respondents believed

that smoking LCCs was just as harmful as cigarette smoking. With regard to frequency of use, 42.4% of respondents believed that daily LCC smoking was “very risky,” while only 22.1% of respondents believed that occasional LCC smoking was “very risky”.

When comparing risk perception items across the smoking subgroups, the multinomial logistic regression analyses found that, compared to cigarette smokers who believed that daily LCC smoking was “very risky,” those who believe it was “somewhat risky” had greater odds of dual smoking; those who were uncertain about the risk of daily LCC smoking had lower odds of dual smoking (Group 1) than non-LCC-susceptible cigarette smoking (Group 3). Further, compared to cigarette smokers who believed that occasional LCC smoking was “very risky,” those who believed that occasional use was “a little risky” had greater odds of dual smoking (Group 1) than non-LCC-susceptible cigarette smoking (Group 3).

Compared to those who believed that LCCs were addictive, those who were uncertain about their addictiveness had greater odds of LCC-susceptible smoking (Group 2) than non-LCC-susceptible smoking (Group 3). Compared to those who believed that daily LCC smoking was “very risky,” those who believed that daily use was “a little risky” had greater odds of LCC-susceptible smoking (Group 2) than non-LCC-susceptible smoking (Group 3).

Risk Perceptions and Intention to Smoke LCCs in the Future

Among the 584 dual smokers, 52% indicated that they did not intend to smoke LCCs again; 20.7% intended to smoke LCCs for a short or long time; and 27.3% were unsure if they would smoke LCCs again. [Table 3](#) shows the association between the risk perception items and dual smokers' intent to smoke LCCs again in the future. Compared to smokers who said that LCCs were addictive, those who believed that LCCs were not addictive had 4.8 times the odds of intending to smoke LCCs again compared to never smoking LCCs again. Compared to smokers who believed that smoking LCCs daily was “very risky,” those who believed that daily LCC use was “somewhat risky” had 2.3 times the odds of intending to smoke LCCs again compared to never smoking LCCs again. Notably, cigarette smokers who believed that daily LCC use was “somewhat risky” also had greater odds of being uncertain about their intention to smoke LCCs again in the future, compared to never smoking LCCs again. Finally, those who were uncertain about the harmfulness of daily LCC smoking had 6.8 times the odds of intending to smoke LCCs again compared to never smoking LCCs again. Cigarette smokers who were uncertain about the harmfulness of daily LCC smoking also had almost 13 times the odds of being uncertain about their intention to smoke LCCs in the future, compared to never smoking LCCs again.

Risk Perceptions and Susceptibility to Use LCCs

We conducted a multivariate logistic regression analysis, controlling for sociodemographic factors, to examine the association between perceived risk and susceptibility to use LCCs among cigarette smokers who did not have a history of LCC smoking (Groups 2 and 3 combined). As shown in [Table 4](#), only perceptions about the addictiveness of LCC smoking predicted susceptibility to use LCCs. Compared to those who said that LCCs are addictive, those who were uncertain about the addictiveness of LCCs were more likely to be susceptible to smoking the product in the future.

Discussion

Our study documents the association between perceptions of risk about LCC smoking and the outcomes dual LCC use, susceptibility to use LCCs, and intention to continue LCC use among a probability

Table 1. Sociodemographic Characteristics and Smoking Status Among US Current Cigarette Smokers

Sociodemographic characteristics	Smoking status						
	Overall (N = 1191)	Group 1: Dual smokers (n = 584)		Group 2: LCC-susceptible cigarette smokers (n = 117)		Group 3: Non-LCC-susceptible cigarette smokers (n = 490)	
		%	%	%	%	Adjusted RRR (95% CI)	Adjusted RRR (95% CI)
Prevalence		47.2	12.7	40.1			
Sex							
Male	52.5	65.4	47.6	38.8	Ref.	Ref.	
Female	47.5	34.6	52.4	61.2	0.337** (0.248-0.459)	0.677 (0.415-1.107)	
Age							
18-29	21.7	24.5	34.6	14.4	Ref.	Ref.	
30-44	28.7	30.1	33.6	25.7	0.705 (0.417-1.194)	0.498 (0.248-1.001)	
45-59	31.9	29.9	27.3	35.6	0.543* (0.331-0.889)	0.313** (0.160-0.612)	
≥60	17.7	15.6	4.4	24.4	0.371** (0.220-0.627)	0.0793** (0.0300-0.210)	
Race/ethnicity							
White, non-Hispanic	63.2	69.1	44.0	62.4	Ref.	Ref.	
Black, non-Hispanic	17.2	14.2	26.9	17.7	0.789 (0.504-1.235)	2.019* (1.061-3.840)	
Other, non-Hispanic	6.4	5.1	14.7	5.4	0.692 (0.366-1.310)	3.391** (1.483-7.755)	
Hispanic	13.1	11.6	14.3	14.5	0.624 (0.362-1.075)	1.043 (0.488-2.225)	
Education							
Less than high school	22.2	20.1	32.1	21.6	Ref.	Ref.	
High school	36.1	33.8	29.3	41.0	0.812 (0.502-1.313)	0.557 (0.282-1.102)	
Some college	31.0	33.3	30.7	28.5	1.167 (0.731-1.864)	0.925 (0.474-1.802)	
Bachelor's degree +	10.6	12.8	7.9	9.0	1.400 (0.777-2.523)	0.681 (0.243-1.908)	
Income							
<\$15 000	24.8	22.1	34.4	25.1	Ref.	Ref.	
\$15 000 to \$24 999	10.8	9.1	15.4	11.4	0.801 (0.444-1.443)	1.200 (0.505-2.852)	
\$25 000 to \$39 999	20.2	19.7	18.2	21.3	1.059 (0.641-1.748)	0.775 (0.370-1.622)	
\$40 000 to \$59 999	17.4	17.4	13.3	18.7	0.880 (0.539-1.438)	0.627 (0.286-1.375)	
\$60 000 to \$84 999	11.9	15.6	5.9	9.4	1.440 (0.817-2.539)	0.502 (0.183-1.378)	
\$85 000 to \$99 999	5.0	6.2	1.8	4.6	1.092 (0.518-2.304)	0.288 (0.0639-1.297)	
>\$100 000	9.8	9.8	10.9	9.5	0.849 (0.455-1.582)	0.958 (0.381-2.407)	
Employment							
Not employed	49.8	46.3	53.9	52.6	Ref.	Ref.	
Employed	50.2	53.7	46.1	47.4	0.923 (0.663-1.285)	1.028 (0.569-1.858)	

CI = confidence interval; LCC = little cigar and cigarillo; RRR = Relative risk ratio. All % are column%.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2. Perceived Risk of LCCs by Smoking Status Among US Current Cigarette Smokers

Risk Perceptions	Overall (N = 1191)		Group 1: Dual smokers (n = 584)		Group 2: LCC-susceptible cigarette smokers (n = 117)		Group 3: Non-LCC-susceptible cigarette smokers (n = 490)		Group 1 vs. Group 3		Group 2 vs. Group 3	
	%		%		%		%		Adjusted RRR (95% CI)		Adjusted RRR (95% CI)	
Become addicted to LCCs?												
No	4.6		5.5		7.2		2.8		Ref.		Ref.	
Yes	73.1		76.2		52.1		76.1		1.720 (0.739-4.003)		2.448 (0.818-7.325)	
I don't know	22.3		18.3		40.7		21.1		1.048 (0.670-1.639)		2.829** (1.571-5.094)	
Harmfulness of LCC smoking compared to cigarettes												
Less harmful	3.1		4.3		2.8		1.7		Ref.		Ref.	
About the same	58.6		58.0		55.4		60.3		1.745 (0.680-4.476)		0.851 (0.198-3.658)	
More harmful	13.9		16.9		8.2		12.1		1.533 (0.968-2.426)		0.814 (0.371-1.783)	
I don't know	24.4		20.8		33.6		25.9		1.318 (0.814-2.133)		0.956 (0.451-2.027)	
Harmfulness of smoking LCCs daily												
Very risky	42.4		42.6		26.8		46.9		Ref.		Ref.	
Somewhat risky	26.0		32.4		22.9		19.4		1.614* (1.083-2.405)		1.875 (0.880-3.994)	
A little risky	8.6		8.3		18.3		6.1		0.915 (0.451-1.856)		3.136* (1.123-8.759)	
Not at all risky	0.6		0.7		1.2		0.0		0.816 (0.105-6.296)		2.495 (0.265-23.457)	
I don't know	22.3		15.9		30.8		27.2		0.426* (0.211-0.857)		1.349 (0.488-3.727)	
Harmfulness of smoking LCCs occasionally												
Very risky	22.1		19.7		16.4		26.8		Ref.		Ref.	
Somewhat risky	29.3		31.4		25.7		28.0		1.339 (0.861-2.082)		1.182 (0.521-2.680)	
A little risky	20.3		24.6		18.4		15.8		1.710* (1.019-2.870)		1.059 (0.420-2.670)	
Not at all risky	4.7		5.5		7.7		2.8		2.277 (0.957-5.414)		2.324 (0.631-8.550)	
I don't know	23.6		18.8		31.8		26.6		1.681 (0.801-3.524)		0.839 (0.292-2.408)	

CI = confidence interval; LCC = little cigar and cigarillo; RRR = Relative risk ratio. All % are column%. Multinomial logistic regression models in this table were conducted with all variables shown and controlled for sociodemographic factors.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Predictors of Intention to Continue to Smoke LCCs in the Future Among US Dual Current Cigarette Smokers and Ever LCC Users (*n* = 584)

Risk perception	“Will smoke LCC again” vs. “Won’t smoke LCC again”	“I don’t know” vs. “Won’t smoke LCC again”
	Adjusted RRR (95% CI)	Adjusted RRR (95% CI)
Become addicted to LCC?		
Yes	Ref.	Ref.
No	4.831 (1.148–20.34)*	2.662 (0.652–10.86)
I don’t know	1.662 (0.795–3.475)	0.910 (0.415–1.993)
Harmfulness of LCC smoking compared to cigarette smoking		
About the same level of harm	Ref.	Ref.
Less harmful	1.000 (0.313–3.199)	0.267 (0.0716–0.994)*
More harmful	0.875 (0.395–1.937)	0.431 (0.191–0.974)*
I don’t know	0.479 (0.208–1.102)	0.702 (0.292–1.687)
Harmfulness of smoking LCCs daily		
Very risky	Ref.	Ref.
Somewhat risky	2.300 (1.102–4.802)*	2.595 (1.331–5.063)**
A little risky	3.243 (0.990–10.62)	4.850 (1.877–12.53)**
Not at all risky	0.472 (0.0576–3.866)	—
I don’t know	6.788 (1.555–29.64)*	12.95 (3.956–42.39)***
Harmfulness of smoking LCCs occasionally		
Very risky	Ref.	Ref.
Somewhat risky	1.019 (0.441–2.354)	0.892 (0.405–1.964)
A little risky	0.646 (0.237–1.760)	0.508 (0.217–1.189)
Not at all risky	0.656 (0.144–2.986)	0.543 (0.135–2.175)
I don’t know	0.366 (0.0900–1.491)	0.602 (0.195–1.859)

CI = confidence interval; LCC = little cigar and cigarillo; RRR = Relative risk ratio. Multinomial logistic regression models in this table were conducted with all variables shown and controlled for sociodemographic factors.

p* < .05; *p* < .01; ****p* < .001.

Table 4. Predictors of Susceptibility to Smoke LCCs Among US Current Cigarette Smokers Who Have not Used LCCs (*n* = 607)

Risk perception	Susceptibility to smoke LCCs
	AOR (95% CI)
Become addicted to LCCs?	
Yes	Ref.
No	3.170 (0.948–10.60)
I don’t know	2.908** (1.555–5.437)
Harmfulness of LCC smoking compared to cigarette smoking	
About the same	Ref.
Less harmful	0.866 (0.206–3.639)
More harmful	0.755 (0.332–1.721)
I don’t know	1.176 (0.512–2.700)
Harmfulness of smoking LCCs daily	
Very risky	Ref.
Somewhat risky	1.980 (0.892–4.396)
A little risky	2.938 (0.959–9.005)
Not at all risky	1.299 (0.0869–19.41)
I don’t know	1.209 (0.371–3.939)
Harmfulness of smoking LCCs occasionally	
Very risky	Ref.
Somewhat risky	1.083 (0.446–2.626)
A little risky	0.810 (0.294–2.233)
Not at all risky	1.570 (0.424–5.818)
I don’t know	0.655 (0.192–2.234)

AOR = Adjusted Odds Ratio; CI = confidence interval; LCC = little cigar and cigarillo. Multivariable logistic regression model in this table was conducted with all variables shown and controlled for sociodemographic factors.

p* < .05; *p* < .01.

sample of US adult cigarette smokers. Overall, the majority of smokers in our sample perceived that LCCs were addictive and that smoking LCCs carries the same level of harm as cigarettes. With regard to frequency of use, the majority of respondents perceived daily LCC use to be more harmful than occasional use. Differences in perceptions about the frequency of LCC use were also found across the smoking status subgroups. Compared to those not susceptible to LCC smoking, dual smokers were more likely to perceive that daily LCC use was “somewhat” risky while occasional LCC smoking was “a little” risky; LCC-susceptible smokers also perceived daily LCC smoking to be “a little risky.” Prior studies have found that, unlike cigarette smokers, smokers who use LCCs typically smoke the product less frequently and do not smoke a whole LCC at once.^{11,14} All cigar smoking, including infrequent use, produces toxic smoke^{24,25} and can lead to the absorption of nicotine and other harmful constituents^{26,27} that may increase the risk of several types of chronic diseases and other adverse health affects.^{26–28} Though respondents’ perceptions are inaccurate, it is possible that LCC smoking behavior patterns (ie, smoking them less frequently) contribute to perceptions about health risks.

Our findings suggest that perceptions of risk were not merely subjective beliefs but were also important determinants of LCC smoking behavior. Compared to cigarette smokers who were not susceptible to LCC use, dual smokers who believed that daily use carried minimal risk and believed that LCCs were not addictive were more likely to intend to smoke the product again in the future. As documented in prior studies, some cigarette smokers presume that all cigars (including LCCs) are less dangerous than and are safer alternatives to cigarettes.^{13,29} That these misperceptions are associated with continued LCC smoking among dual smokers is troubling;

dual cigarette and LCC use may increase the likelihood of nicotine dependence,^{11,30} cancer,^{25,26,31} and other chronic health conditions.^{25,32}

Equally concerning was the degree of uncertainty about the addictiveness of LCC smoking among LCC-susceptible cigarette smokers. Over 40% of LCC-susceptible cigarette smokers were uncertain about its addictiveness, and those who were uncertain were almost three times more likely to be susceptible to trying LCC smoking. Richter and colleagues¹⁹ found that a lack of coverage of cigars in anti-tobacco health education campaigns explained perceptions of reduced risk for cigar smoking. Continued lack of coverage may be fueling the uncertainty of and misperceptions about risk for cigar smoking among these smokers. The FDA now requires warning labels to be placed on cigar packages³³; this is an important step to correct misperceptions of the addictiveness and safety of cigars.

The study is not without limitations. First, our measures of risk perception were limited, and only assessed perceived addictiveness of LCCs; its harm compared to cigarette smoking; and harm associated with daily and occasional use of LCCs. Other published studies suggest that perceptions of risk about LCCs are shaped by numerous factors, including, but not limited to, consumers' beliefs about the products' constituents, the flavored tobacco in the LCCs, and LCC package descriptors (eg, text, color).^{12,14,19} Additional studies using expanded measures of perceptions of risk are needed. Second, our definition of dual smokers included ever (rather than current) LCC smoking. Future studies that define dual smokers as current (ie, past 30-day) cigarette and LCC users are warranted to replicate our study findings. We assessed susceptibility to trying LCCs using a single questionnaire item, rather than the traditional three to four items that have been validated for cigarette smoking.³⁴ As such, study findings should be interpreted with caution.

Our study suggests that perceptions of risk about the addictiveness of LCCs and frequency of LCC use are important determinants of intention to continue LCC use among cigarette smokers with a history of LCC use. These perceptions are also determinants of LCC smoking susceptibility among cigarette smokers. The Center for Tobacco Products is tasked with correcting misperceptions about regulated tobacco products and educating the public about the dangers of use, including health risks and addictiveness of the product. As noted above, the Center for Tobacco Products will require advertising and package warning labels, including addictiveness warning labels, for all newly deemed products, including LCCs.³³ Once the warnings are implemented, future studies should evaluate the effectiveness of the warning labels on adult smokers' perceptions of the addictiveness of LCCs to further inform the development of health communication campaigns. Misperceptions about the frequency of LCC use and its association with LCC smoking outcomes (ie, intention to continue use) suggest the need for additional health communication messages that convey that any use of cigars (either daily or occasional use) is harmful and carries the risk of adverse negative health outcomes. Current FDA initiatives, that is, the Fresh Empire campaign,³⁵ may be appropriate to address these misperceptions among adults.

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Declaration of Interests

None declared.

References

1. Agaku IT, King BA, Husten CG, et al. Tobacco product use among adults—United States, 2012–2013. *MMWR Morb Mortal Wkly Rep.* 2014;63(25):542–547.
2. Delnevo CD, Giovenco DP, Ambrose BK, Corey CG, Conway KP. Preference for flavoured cigar brands among youth, young adults and adults in the USA. *Tob Control.* 2015;24(4):89–94. doi:10.1136/tobaccocontrol-2013-051408.
3. Cantrell J, Kreslake JM, Ganz O, et al. Marketing little cigars and cigarillos: advertising, price, and associations with neighborhood demographics. *Am J Public Health.* 2013;103(10):1902–1909. doi:10.2105/AJPH.2013.301362.
4. Cohn A, Cobb CO, Niaura RS, Richardson A. The other combustible products: prevalence and correlates of little cigar/cigarillo use among cigarette smokers. *Nicotine Tob Res.* 2015;17(12):1473–1481. doi:10.1093/ntr/ntv022.
5. Rath JM, Villanti AC, Abrams DB, Vallone DM. Patterns of tobacco use and dual use in US young adults: the missing link between youth prevention and adult cessation. *J Environ Public Health.* 2012;2012:1–9. doi:10.1155/2012/679134.
6. Richardson A, Xiao H, Vallone DM. Primary and dual users of cigars and cigarettes: profiles, tobacco use patterns and relevance to policy. *Nicotine Tob Res.* 2012;14(8):927–932. doi:10.1093/ntr/ntn306.
7. Corey CG, King BA, Coleman BN, et al. Little filtered cigar, cigarillo, and premium cigar smoking among adults—United States, 2012–2013. *MMWR Morb Mortal Wkly Rep.* 2014;63(30):650–654.
8. Messer K, White MM, Strong DR, et al. Trends in use of little cigars or cigarillos and cigarettes among U.S. smokers, 2002–2011. *Nicotine Tob Res.* 2015;17(5):515–523. doi:10.1093/ntr/ntu179.
9. King BA, Dube SR, Tynan MA. Flavored cigar smoking among U.S. adults: findings from the 2009–2010 National Adult Tobacco Survey. *Nicotine Tob Res Off J Soc Res Nicotine Tob.* 2013;15(2):608–614. doi:10.1093/ntr/nts178.
10. Wray RJ, Jupka K, Berman S, Zellin S, Vijaykumar S. Young adults' perceptions about established and emerging tobacco products: results from eight focus groups. *Nicotine Tob Res.* 2012;14(2):184–190. doi:10.1093/ntr/ntn168.
11. Baker F, Dye JT, Denniston MM, Ainsworth SR. Risk perception and cigar smoking behavior. *Am J Health Behav.* 2001;25(2):106.
12. Malone RE, Yerger V, Pearson C. Cigar risk perceptions in focus groups of urban African American youth. *J Subst Abuse.* 2001;13(4):549–561.
13. Nyman AL, Taylor TM, Biener L. Trends in cigar smoking and perceptions of health risks among Massachusetts adults. *Tob Control.* 2002;11(suppl 2):ii25–28.
14. Sterling KL, Fryer CS, Fagan P. The most natural tobacco used: a qualitative investigation of young adult smokers' risk perceptions of flavored little cigars and cigarillos. *Nicotine Tob Res.* 2016;18(5):827–833. doi:10.1093/ntr/ntv151.
15. National Cancer Institute. *The Role of the Media in Promoting and Reducing Tobacco Use. Tobacco Control Monograph No. 19.* Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2008.
16. Etzel E, Monohan E, Ece I. Camel filter revised packaging test: Consumer research proposal. 1979. <http://legacy.library.ucsf.edu/tid/qxb79d00>. Accessed September 8, 2016.
17. Gauvin G. *Putting an End to Deception: A Report to the Canadian Minister of Health.* Ottawa, ON, Canada: Ministerial Advisory Council on Tobacco Control; 2001. www.cctc.ca/cctc/EN/fundamentals/cessation/basics/Putting_an_End_to_Deception.pdf/view. Accessed September 8, 2016.
18. Jolly DH. Exploring the use of little cigars by students at a historically black university. *Prev Chronic Dis.* 2008;5(3):A82.

19. Richter P, Caraballo R, Pederson LL, Gupta N. Exploring use of nontraditional tobacco products through focus groups with young adult smokers, 2002. *Prev Chronic Dis.* 2008;5(3):A87.
20. Page JB, Evans S. Cigars, cigarillos, and youth -- emergent patterns in subcultural complexes. *J Ethn Subst Abuse.* 2004;2(4):63. doi:10.1300/J233v02n04_04.
21. Richter PA, Pederson LL, O'Hegarty MM. Young adult smoker risk perceptions of traditional cigarettes and nontraditional tobacco products. *Am J Health Behav.* 2006;30(3):302–312. doi:10.5555/ajhb.2006.30.3.302.
22. Slovic P. *Smoking Risk, Perception & Policy.* Thousand Oaks, CA: Sage Publications; 2001.
23. Weaver SR, Majeed BA, Pechacek TF, Nyman AL, Gregory KR, Eriksen MP. Use of electronic nicotine delivery systems and other tobacco products among USA adults, 2014: results from a national survey. *Int J Public Health.* 2016;61(2):177–188. doi:10.1007/s00038-015-0761-0.
24. Baker F, Ainsworth SR, Dye JT, Crammer C, Thun M, Hoffmann D. Health risks associated with cigar smoking. *J Am Med Assoc.* 2000;284(18):735–740.
25. National Cancer Institute. *Cigars: Health Effects and Trends. Smoking and Tobacco Control Monograph No. 9.* Bethesda, MD: U.S. DHHS, National Institutes of Health, National Cancer Institute; 1998.
26. Rodriguez J, Jiang R, Johnson WC, MacKenzie BA, Smith LJ, Barr RG. The association of pipe and cigar use with cotinine levels, lung function, and airflow obstruction: a cross-sectional study. *Ann Intern Med.* 2010;152(4):201–210. doi:10.1059/0003-4819-152-4-201002160-00004.
27. Chen J, Kettermann A, Rostron BL, Day HR. Biomarkers of exposure among U.S. cigar smokers: an analysis of 1999–2012 National Health and Nutrition Examination Survey (NHANES) data. *Cancer Epidemiol Biomark Prev Publ Am Assoc Cancer Res Cosponsored Am Soc Prev Oncol.* 2014;23(12):2906–2915. doi:10.1158/1055-9965.EPI-14-0849.
28. Wyss A, Hashibe M, Chuang S-C, et al. Cigarette, cigar, and pipe smoking and the risk of head and neck cancers: pooled analysis in the International Head and Neck Cancer Epidemiology Consortium. *Am J Epidemiol.* 2013;178(5):679–690. doi:10.1093/aje/kwt029.
29. Latimer LA, Batanova M, Loukas A. Prevalence and harm perceptions of various tobacco products among college students. *Nicotine Tob Res.* 2014;16(5):519–526. doi:10.1093/ntr/ntt174.
30. Hoffmann D, Wynder EL. Smoke of cigarettes and little cigars: an analytical comparison. *Science.* 1972;178(4066):1197–1199.
31. Boffetta P, Nyberg F, Agudo A, et al. Risk of lung cancer from exposure to environmental tobacco smoke from cigars, cigarillos and pipes. *Int J Cancer J Int Cancer.* 1999;83(6):805–806.
32. Iribarren C, Tekawa IS, Sidney S, Friedman GD. Effect of cigar smoking on the risk of cardiovascular disease, chronic obstructive pulmonary disease, and cancer in men. *N Engl J Med.* 1999;340(23):1773–1780. doi:10.1056/NEJM199906103402301.
33. Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Merritt RK. Validation of susceptibility as a predictor of which adolescents take up smoking in the United States. *Health Psychol.* 1996;15(5):355–361.
34. U. S. Food and Drug Administration. Deeming Tobacco Products To Be Subject to the Federal Food, Drug, and Cosmetic Act, as Amended by the Family Smoking Prevention and Tobacco Control Act; Restrictions on the Sale and Distribution of Tobacco Products and Required Warning Statements for Tobacco Products. 2016:1–499. www.federalregister.gov/articles/2016/05/10/2016-10685/deeming-tobacco-products-to-be-subject-to-the-federal-food-drug-and-cosmetic-act-as-amended-by-the. Accessed May 10, 2016.
35. Food and Drug Administration, Center for Tobacco Products. Fresh Empire Campaign. 2015. www.fda.gov/TobaccoProducts/PublicHealthEducation/PublicEducationCampaigns/FreshEmpireCampaign/default.htm. Accessed June 22, 2016.