

Li-Ling Huang, PhD, MPH¹; Sarah Kowitt, MPH²; Tanha Patel, MPH³; Leah Ranney, PhD⁴; Erin L. Sutfin, PhD⁵; Adam O. Goldstein, MD, MPH⁴

1. University of North Carolina at Chapel Hill, Lineberger Comprehensive Cancer Center; 2. University of North Carolina at Chapel Hill, Gillings School of Global Public Health; 3. North Carolina Department of Health and Human Services, Tobacco Prevention and Control Branch; 4. University of North Carolina at Chapel Hill, Department of Family Medicine; 5. Wake Forest School of Medicine, Department of Social Sciences and Health Policy.

Background

- A growing body of epidemiologic studies on hookah use (Figure 1) among US adolescents has shown this alternative tobacco use is widespread and is rising.¹⁻⁴
- Identification of correlates of hookah use by adolescents can facilitate campaigns to decrease use.
- This study assess trends and correlates of hookah use among high school (HS) students in North Carolina (NC).

Figure 1. Hookah device



Image Source: Wake Forest Baptist Health

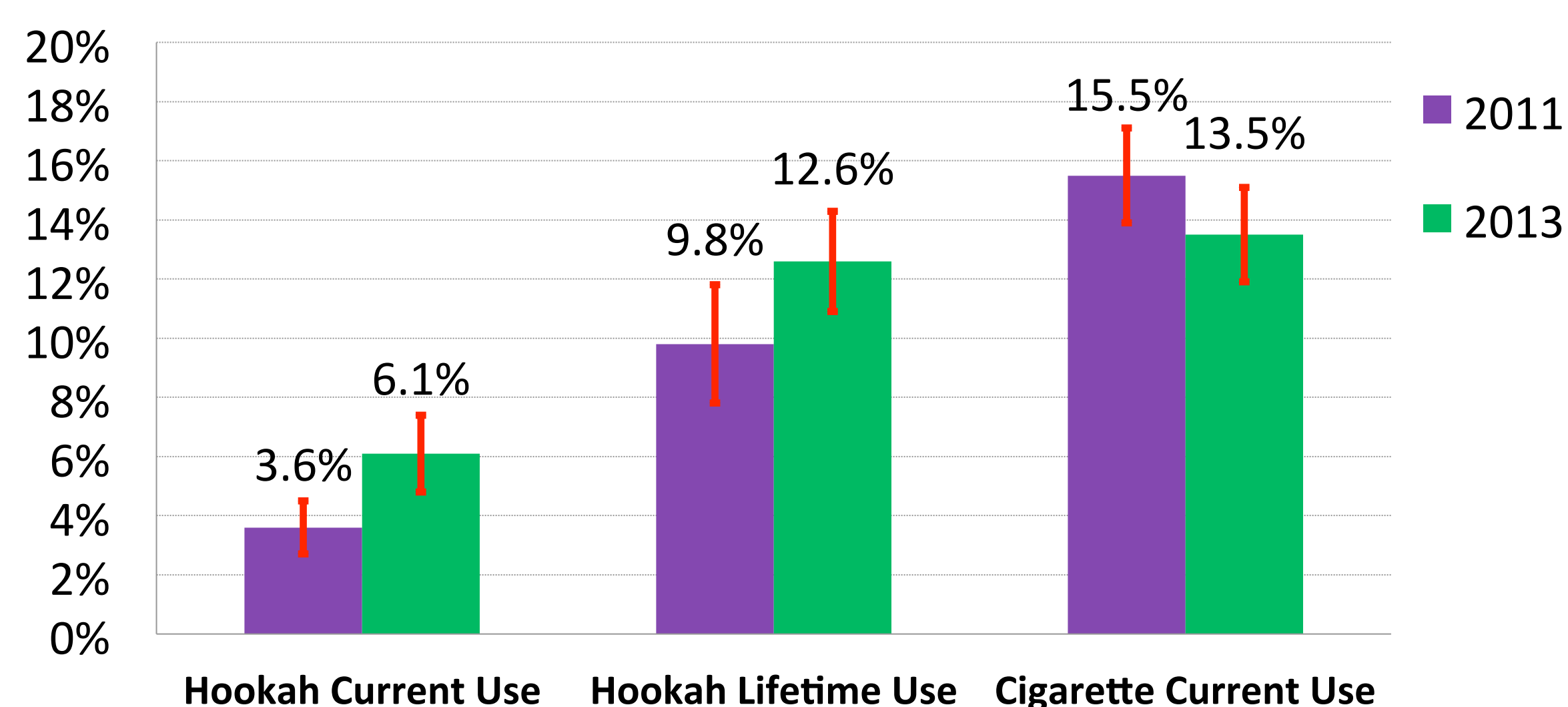
Methods

- Data come from the NC Youth Tobacco Survey (NCYTS), 2011 and 2013.
- Data include 4,791 HS students in 2011 and 4,092 HS students in 2013 (response rate: 78.2% in 2011 and 67.84% in 2013).
- The NCYTS uses a two-stage cluster design with corresponding sampling weights to produce representative data of HS students.
- Hookah current use defined as use on ≥ 1 day in last month.
- Lifetime use defined as ever trying, even just one time, in the past, including having used hookah on ≥ 1 day in last month.
- Bivariate/multivariate logistic regression analyses to examine correlates of hookah lifetime use in 2013.

Results

- More than half of respondents in 2013 was female (51%) and white (54%). One out of ten non-current smokers were considered susceptible to cigarette smoking; among them 26% were lifetime hookah users.

Figure 2. Prevalence of Hookah and Cigarette Use in 2011 and 2013



Results

Table 1. Factors Associated with Hookah Lifetime Use in 2013

Correlates*	Hookah lifetime use (n=486) compared to all others (n=3,590) in 2013				
	%	OR	95% CI	AOR	95% CI
Sex					
Female	12%	ref		ref	
Male	13%	1.14	0.92-1.42	0.91	0.66-1.26
Race/Ethnicity					
African American	9%	ref		ref	
Other	11%	1.28	0.84-1.96	1.03	0.52-2.05
Hispanic/Latino	13%	1.63 ^b	1.22-2.17	1.13	0.70-1.82
White	15%	1.82 ^c	1.34-2.46	1.09	0.70-1.69
Grade					
9th	7%	ref		ref	
10th	10%	1.51	0.95-2.41	1.45	0.73-2.86
11th	15%	2.40 ^c	1.68-3.43	1.99 ^a	1.15-3.43
12th	20%	3.30 ^c	2.10-5.19	2.75 ^b	1.46-5.19
Weekly disposable income					
\leq \$10	8%	ref		ref	
\$11 to \$50	12%	1.64 ^b	1.22-2.22	1.58 ^a	1.17-2.40
$>$ \$50	18%	2.61 ^c	2.02-3.38	1.80 ^b	1.31-2.74
Smoking susceptibility**					
No	6%	ref		ref	
Yes	37%	2.26 ^c	1.92-2.59	2.62 ^c	1.81-3.78
Current cigarette use					
None	4%	ref		ref	
Ever smoked cigarettes***	19%	6.11 ^c	4.07-9.17	3.40 ^c	1.98-5.85
Smoked any cigarettes in the past 30 days	45%	21.35 ^c	12.42-36.69	4.13 ^c	2.09-8.19
Number of Closest friends who smoke cigarettes					
0	7%	ref		ref	
1	14%	2.34 ^c	1.64-1.30	0.87	0.59-1.30
2	24%	4.31 ^c	2.97-6.26	1.20	0.79-1.83
3	24%	4.42 ^c	2.43-8.04	0.89	0.52-1.52
4	44%	10.90 ^c	7.48-15.88	1.55 ^a	1.16-2.87
Family members who use tobacco products					
None	9%	ref		ref	
Hookah	53%	10.75 ^c	6.11-18.92	4.36 ^c	2.24-8.49
Other tobacco products	14%	1.57 ^c	1.30-1.89	0.74	0.54-1.03
Like/positive comments on tobacco in social media					
No	11%	ref		ref	
Yes	27%	3.18 ^c	2.40-4.22	1.63 ^b	1.17-2.27
All tobacco products are dangerous					
Agree	11%	ref		ref	
Disagree	22%	2.31 ^c	1.77-3.03	1.21	0.81-1.80
Breathing secondhand smoke is					
Harmful	11%	ref		ref	
Not harmful	27%	2.95 ^c	2.29-3.80	2.14 ^c	1.59-2.88

Note. OR = odds ratio; AOR = adjusted odds ratio; CI = confidence interval; Superscript letters denote significance levels for logistic regression: a for $p < .05$, b for $p < .01$, c for $p < .001$.
 * Only correlates with significant ORs /AORs are reported in Table 1. Correlates that do not show significance are not reported in Table 1. These correlates are belief about tobacco companies marketing to youth, awareness of online tobacco advertising, awareness of tobacco advertising in convenience stores, supermarkets, or gas stations, participation in school or community activities to discourage youth from tobacco use, taught classes about why youth should not use tobacco products, saw a teacher or anyone else who works or volunteers in schools use any tobacco products on campus or school buses, and saw or heard any ads about dangers of smoking in the past 30 days.
 ** Smoking susceptibility was defined as one who reported that he or she will smoke a cigarette in the next year, will try a cigarette soon, or will smoke a cigarette if one of his or her friends were to offer.
 *** Had ever smoked cigarettes, even one or two puffs, but did not smoke in the past 30 days.

Results and Discussions

- Nearly a 70% increase in current hookah use among NC HS students over the past two years, although youth cigarette use is in decline (Figure 2).
- Lifetime hookah users tend to be older and have higher weekly disposable income, similar to findings of previous studies.¹⁻²
- Over 1/3 of youth susceptible to cigarette smoking are lifetime hookah users.
- Over half of current hookah users currently use cigarettes. About one fifth of lifetime hookah users reported never trying a cigarette, suggesting that hookah use may be their gateway for cigarette use.
- Future research needs to explore whether initiation of alternative tobacco products serve as a gateway to cigarette smoking.
- Higher rates of hookah lifetime use among students whose closest friends smoke cigarettes and family members use hookah, suggesting the importance of social influences.
- Perceived harms of secondhand-smoke decreases odds of lifetime hookah use. Messages on harms of secondhand-smoke exposure to hookah may resonate among lifetime hookah users.

Limitations

- Causality is difficult to conclude from a cross-sectional survey.
- The findings are subject to self-reported, recall biases and social desirability.
- Results may not generalize to youth in other populations other than NC high school students; however, results are similar to national results for high school students.¹

Conclusions

- Despite decreasing youth cigarette use, rising rates of hookah use among youth show it is a major public health issue.
- Current public health efforts to target high school students with anti-tobacco messaging through communication campaigns, school curriculum and community activities must discuss specific harms of hookah use.
- Implication of increased hookah use among youth who live with hookah users indicates a need for comprehensive tobacco control programs that involve families and emphasize social influences.

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