

Examining the Association between Flavor Categories of Electronic Nicotine Delivery Systems (ENDS) and Smoking Cessation among U.S. Women of Reproductive Age, Pregnant and Not-Pregnant

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Abstract

Background

Many women of reproductive age (WRA) who smoke conventional cigarettes turn to electronic nicotine delivery systems (ENDS) in an effort to reduce or quit smoking. As flavors may be of special appeal to this population, determining the extent to which use of flavored ENDS predicts quitting smoking represents an opportunity for enhanced tobacco regulation. This study examined whether use of flavored ENDS predicted quitting current use of conventional cigarettes among WRA.

Methods

The sample included WRA (n=501; 22 pregnant women, 479 not-pregnant women) participating in Waves 3 (W3) and 4 (W4) of the Population Assessment for Tobacco and Health Study. The W3 WRA reported dual use (i.e., conventional cigarettes and ENDS), and the sample included those who did and did not endorse using ENDS to quit or cut down on smoking.

Results

WRA who reported regular use of flavored ENDS in W3 were more likely to report that they had quit smoking in W4 compared to WRA who reported using only tobacco-flavored ENDS in W3 (Wald Chi-Square=12.61, $p<.001$); that relationship was observed among women who were pregnant in W4 (49.6% quit [95%CI=17.5-82.0%] vs. 0.0% [95%CI=0.0-0.2%] $p=.001$) and women who were not-pregnant in W4 (12.3% quit [95%CI=7.7-19.0%] vs. 2.3% [95%CI=0.5-9.5%] $p=.02$). Importantly, these results extended to WRA who did and did not report using ENDS to help quit or cut down on smoking.

Conclusions

In summary, this longitudinal study identified a positive association across consecutive waves wherein use of ENDS flavors other than exclusive use of tobacco flavor in an earlier wave predicted a greater rate of quitting smoking in a later wave. This observation identifies a potential unintended adverse impact of policies limiting access to flavored ENDS.

Background

- Smoking prevalence among U.S. women of reproductive age (WRA) is as high as 20% – approximately 5% higher than the U.S. national average.
- WRA who smoke, especially those currently or planning to become pregnant, may use electronic nicotine delivery systems (ENDS) to reduce or quit cigarette smoking.
- ENDS are available in a variety of flavors, and the majority of WRA who use ENDS report doing so for the flavors (82% of pregnant women; 60% of not-pregnant women).
- As many WRA report using ENDS to help reducing/quitting smoking in addition to appeal of flavors, it is important to examine whether flavored ENDS use is associated with smoking cessation.

Purpose of the Current Study

- Examine whether WRA (pregnant and not-pregnant) who report using conventional cigarettes and ENDS (i.e., dual users) are more or less likely to discontinue smoking conventional cigarettes based on use of flavored ENDS

Methods

Participants

- 501 WRA (22 pregnant women, 479 not-pregnant women) in Waves 3 (W3) and 4 (W4) of the Population Assessment for Tobacco and Health (PATH) Study
- WRA in W3 reported dual use of conventional cigarettes and ENDS
- The sample included WRA who did and did not endorse using ENDS to quit or cut down on smoking cigarettes

Independent Variable

- W3 ENDS flavor use
 - “Tobacco” only vs.
 - “Other” flavors: menthol/mint, clove/spice, fruit, chocolate, alcoholic/non-alcoholic drinks, candy/desserts/sweets, or some other flavor

Primary Outcome

- W4 use of conventional cigarettes (yes/no)

Covariates

- Age, race/ethnicity, education, pregnancy status

Analysis

- Logistic regression

Results

Table 1. Sociodemographic and electronic nicotine delivery systems (ENDS) use characteristics of women of reproductive age (WRA) who reported dual use of conventional cigarettes and ENDS in Wave 3 of the Population Assessment for Tobacco and Health Study.

	All WRA (n=501) % (95% CI)	Not Pregnant (n=479) % (95% CI)	Pregnant (n=22) % (95% CI)
Age			
18 to 24 years old	21.3% (17.8-24.9%)	20.9% (17.3-24.4%)	32.0% (8.8-55.2%)
25 to 34 years old	36.0% (31.1-40.9%)	34.5% (29.4-39.7%)	68.0% (44.8-91.2%)
35 to 44 years old	30.9% (26.2-35.6%)	32.3% (27.5-37.2%)	0.0% (0.0-0.0%)
45 to 50 years old	11.7% (8.4-15.1%)	12.3% (8.7-15.8%)	0.0% (0.0-0.0%)
Race/Ethnicity			
White, Non-Hispanic	74.2% (69.6-78.9%)	74.0% (69.2-78.7%)	79.8% (61.9-97.7%)
Black, Non-Hispanic	9.4% (6.8-11.9%)	9.4% (6.8-11.9%)	9.8% (0.0-23.7%)
Other, Non-Hispanic	7.9% (4.3-11.5%)	8.1% (4.4-11.8%)	3.1% (0.0-9.7%)
Hispanic	8.5% (6.1-10.9%)	8.6% (6.0-11.1%)	7.3% (0.0-18.3%)
Education			
Less than HS/GED	19.8% (15.7-23.8%)	20.4% (16.1-24.6%)	7.1% (0.0-18.9%)
High School Diploma	26.1% (20.7-31.5%)	26.1% (20.6-31.6%)	26.8% (0.6-53.0%)
Some College/ Associate's Degree	44.1% (39.4-48.8%)	43.4% (38.6-48.2%)	58.5% (33.4-83.6%)
Bachelor's/ Advanced Degree	10.0% (6.5-13.5%)	10.1% (6.5-13.7%)	7.7% (0.0-23.5%)
W3 Flavor Use			
Tobacco Only	14.3% (10.3-18.2%)	14.0% (10.0-17.9%)	21.3% (0.0-44.0%)
Flavored	85.7% (81.8-89.7%)	86.0% (82.1-90.0%)	78.7% (56.0-100.0%)
W3 Endorse Use of ENDS for Quitting/Cutting Down on Cigarettes			
No	18.0% (14.6-21.5%)	18.5% (14.9-22.1%)	9.4% (0.0-21.4%)
Yes	82.0% (78.5-85.4%)	81.5% (77.9-85.1%)	90.6% (78.6-100.0%)

Table 2. Multivariate logistic regression modeling wave 3 ENDS flavor use (tobacco only vs. other flavors) predicting quitting cigarettes (i.e., reporting no use of conventional cigarettes) in wave 4 among WRA in the Population Assessment for Tobacco and Health Study.

Effect	DF	Type 3 Analysis of Effects	
		Wald Chi-Square	p
Age	3	8.13	0.0434
Race/ethnicity	3	7.87	0.0489
Education	3	11.69	0.0085
Pregnancy Status	1	5.03	0.0249
W3 Flavor (Tobacco Only vs. Other Flavor)	1	12.61	0.0004
Pregnancy*W3 Flavor	1	8.77	0.0031

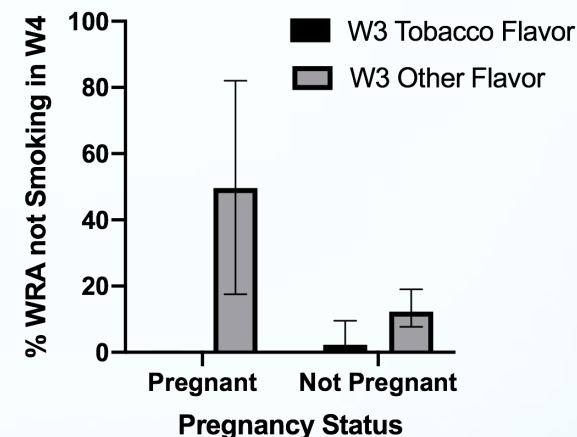


Figure 1. Percentage of WRA (by pregnancy status) who reported dual use of conventional cigarettes and ENDS (tobacco flavor vs. other flavors) in Wave 3 and reported no use of conventional cigarettes in Wave 4 of the Population Assessment for Tobacco and Health Study.

Conclusions

- WRA dual users of conventional cigarettes and ENDS who reported regular use of flavored ENDS vs. only tobacco flavor in W3 were more likely to report no use of conventional cigarettes in W4.
- This association was observed among pregnant and not-pregnant women.
- The association suggests that use of flavored ENDS may help WRA transition away from conventional cigarettes. The correlational nature of the relationship precludes causal inferences.
- This observation suggests a potential unintended adverse consequence of policies limiting access to flavored ENDS.