#### ABSTRACT

Background: Electronic cigarettes entered the U.S. market in 2007, and the affordability, availability, and marketing of these products has increased over recent years. Little is known about the use of these products among parents.

Objective: We assessed electronic cigarette use among parents, predictors of use, and motivations for use.

Design/Methods: We administered a survey to adults who lived in multiunit housing, using a probability-based internet panel. This panel is based on a sampling frame which includes both listed and unlisted numbers, those without a landline telephone, and does not accept selfselected volunteers. Survey items to assess electronic cigarette use are from the PATH study. ChiSquare analyses were used to examine predictors of use, while multivariable analyses controlled for demographics.

Results: Of eligible panelists contacted, 88% completed the survey. 715 of these adults (22%) were parents. Among parents, 13% had tried an electronic cigarette and 6% reported past 30 day use. Although use is higher among current smokers, 45% of parents who had tried electronic cigarettes and 49% of parents who report past 30 day use of electronic cigarettes are never or former smokers (12 of 142 former smokers reported using electronic cigarettes to quit tobacco). Ever users endorsed several reasons for using these products; can be used in places where smoking is not allowed (72%), less harmful than cigarettes (79%), might be less harmful to people nearby (81%), and to help them quit using tobacco (62%). In multivariable analyses, ever use of electronic cigarettes was associated with younger age, current or former cigarette smoking, and high school diploma or some college. Use did not vary by sex.

Conclusions: Many parents are using electronic cigarettes, and half of current users are never or former smokers. Use of electronic cigarettes raises concerns about nonsmokers being at risk for nicotine dependence and current smokers maintaining their dependence. The risks of exposure are unknown, yet many parents report using these electronic cigarettes to reduce harm to others. Greater awareness of the prevalence of use for these products and the high risk demographic user groups will inform efforts to determine appropriate public health policy and regulatory action. Future research should address cigarette use trajectories among smokers and nonsmokers who use electronic cigarettes and social influences on electronic cigarette use.

# Use of *Electronic Cigarettes* Among Parents



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#### INTRODUCTION

Electronic cigarettes entered the U.S. market in 2007 and are often promoted as safer alternatives to traditional cigarettes and a potential way to decrease the harm caused by tobacco. The unknown risks of electronic cigarettes are likely to be less harmful than combustible cigarettes. Although research on the harms of secondhand vapor is limited, electronic cigarettes can produce volatile organic compounds, heavy metals, and other toxins in the vapor released, albeit in lower levels than combustible tobacco. The FDA announced its intention to regulate electronic cigarettes as tobacco products in April of 2011 under its authority provided by the Tobacco Control Act and implemented an electronic cigarette deeming rule in April of 2014. This deeming rule, however, did not address marketing restrictions, flavors, or child-safety measures.

In the absence of sufficient data and FDA regulation on marketing and flavors, the increasing use of electronic cigarettes raises several concerns about child health. These concerns involve the unknown characteristics of this product, the health effects for nonusers exposed to the vapor, the impact of use on parental cigarette smoking behaviors, and the lack of any product safety and poison prevention regulation. The limited amount of research on the social penetration of electronic cigarettes indicates annual growth in both awareness and use of electronic cigarettes. Although use is substantially higher among smokers than nonsmokers, several studies have found nontrivial levels of use among nonsmokers. The purpose of this study is to assess use of electronic cigarettes among U.S. parents, demographic predictors of use, smoking status of electronic cigarette users, and reasons that parents report for using electronic cigarettes. Results from this study can inform regulatory decisions about these products, while the identification of potential high risk demographic groups can guide clinical counseling efforts regarding the risks of any tobacco or nicotine use.

# METHODS stered a survey to a random sample days were

GfK administered a survey to a random sample of adults who lived in multiunit housing, using their probabilitybased internet panel. This panel is based on a sampling frame which includes both listed and unlisted numbers, those without a landline telephone, and does not accept self-selected volunteers and provides sample coverage for 99% of U.S. households. Surveys were administered in September of 2013. For this survey, a nationally representative sample of U.S. adults (18 and older) who live in either a building with 2 or more apartments or a one-family house attached to one or more houses was selected. Data were weighted to adjust for design effects and a poststratification process was applied to adjust for any survey non-response as well as any non-coverage or under and oversampling resulting from the studyspecific sample design. The Institutional Review Board at Mississippi State University approved this study, and informed verbal consent was obtained and the IRB provided a waiver of documentation of the written

#### Self-Reported Use of Electronic Cigarettes

Survey items to assess electronic cigarette use are from the PATH study. Respondents were asked "Have you ever heard of a product called electronic cigarettes or E-cigarettes, or brands such as Smoking Everywhere, NJOY, Blu, or others?" Respondents who had heard of electronic cigarettes were asked, "Have you tried Electronic Cigarettes or E-cigarettes, even just one time?"

#### Self-Reported Smoking

consent process.

Respondents were asked, "Have you smoked at least 100 cigarettes in your entire life?" Respondents who reported that they had were then asked, "Do you now smoke cigarettes every day, some days, or not at all?" Respondents who reported that they have smoked at least 100 cigarettes and now smoke every day or some

days were categorized as current smokers, while those who reported not at all were categorized as former smokers. Former smokers were asked, "About how long has it been since you last smoked cigarettes regularly?" In analyses of electronic cigarette use among never and former smokers, former smokers who had quit smoking less than five years ago were considered to be recent former smokers and those who had quit more than five years ago (and before electronic cigarettes entered the U.S. market) were considered to distant former smokers.

#### Analyses

Chi-Square analyses were used to examine predictors of use, while multivariable analyses controlled for demographics.

#### TABLE 1. SAMPLE CHARACTERISTICS

	Unweighted	Weighted
Cigarette Smoking Status Never Smoker (n=433) Former Smoker (n=146) Current Smoker (n=707)	60.6% 20.4% 17.9%	62.7% 16.8% 19.8%
<b>Age</b> 18-29 (n=206) 30-44 (n=330) 45+ (n=170)	28.8% 46.2% 25.0%	30.5% 51.5% 18.1%
Education Less than HS (n=108) High School (n=214) Some College (n=200) College Degree (n=193)	15.1% 29.9% 28.0% 27.0%	21.3% 28.6% 28.3% 21.8%
Race White, non-hispanic (n=283) Black, non-hispanic (n=112) Other, non-hispanic (n=68) Hispanic (n=252)	39.6% 15.7% 9.5% 35.3%	34.6% 15.2% 11.5% 38.7%
<b>Sex</b> Male (n=308) Female (n=407)	43.1% 56.9%	43.2% 56.8%
Region Northeast (n=160) Midwest (n=125) South (n=196) West (n=234)	22.4% 17.5% 27.4% 32.7%	23.0% 13.9% 31.7% 31.5%
Income Less than \$50,000 (n=559) \$50,000+ (n=156)	78.2% 21.8%	68.6% 31.4%

## TABLE 3. MULTIVARIABLE PREDICTORS OF AWARENESS AND USE OF ELECTRONIC CIGARETTES

	Heard of Electronic Cigarettes	Has Tried Electronic Cigarettes	Past 30 Day Use of Electronic Cigarettes
Cigarette Smoking Status Never Smoker Former Smoker Current Smoker	REF 0.3 (0.2-0.6) 0.8 (0.5-1.3)	REF 2.9 (1.5-5.6) 8.8 (4.9-15.7)	REF 4.3 (1.6-11.1) 7.5 (3.2-17.8)
<b>Age</b> 18-29 30-44 45+	2.2 (1.3-4.0) 1.7 (1.0-2.9) REF	<b>4.2 (1.7-10.2) 2.7 (1.2-6.1)</b> REF	3.3 (0.9-12.7) <b>3.6 (1.0-12.9)</b> REF
Education Less than HS High School Some College College Degree	5.0 (3.0-8.3) 0.7 (0.4-1.1) 0.7 (0.4-1.3) REF	0.2 (0.1-0.8) <b>2.0 (1.1-3.6)</b> 0.6 (0.3-1.4) REF	0.0 (0.0-1.3) <b>3.0 (1.4-6.4)</b> 0.3 (0.0-1.6) REF
Race White, non-hispanic Black, non-hispanic Other, non-hispanic Hispanic	0.7(0.4-1.2) REF 1.0 (0.5-1.7) <b>2.5 (1.4-4.7)</b>	2.8 (1.6-5.0) REF 0.7 (0.3-1.8) 0.2 (0.0-1.3)	0.9 (0.4-1.8) REF 0.3 (0.1-1.0) 0.0 (0.0-0.0)
<b>Sex</b> Male (n=308) Female (n=407)	1.0 (0. <i>7</i> -1.4) REF	1.3 (0.8-2.2) REF	1.2 (0.6-2.5) REF
Region Northeast Midwest South West	REF 1.1 (0.6-2.0) 1.1 (0.6-1.8) 1.8 (1.1-3.0)	REF 0.6 (0.3-1.5) 0.9 (0.5-1.8) 1.4 (0.7-2.7)	REF 1.9 (0.5-6.9) 3.0 (1.1-8.4) 2.8 (1.0-8.2)
Income Less than \$50,000 \$50,000+	0.6 (0.3-0.9) REF	0.9 (0.5-1.5) REF	1.5 (0.7-3.2) REF

## TABLE 4. REASONS FOR USING ELECTRONIC CIGARETTES

They are affordable	56.3%
Can use in places where smoking cigarettes isn't allowed	71.5%
Might be less harmful to me than cigarettes	78.8%
Might be less harmful to people around me than cigarettes	81.1%
Using e-cigarettes help people to quit smoking cigarettes	62.4%
Using an e-cigarettes feels like smoking regular cigarettes	47.2%
E-cigarettes don't smell	54.9%
E-cigarettes are more acceptable to non-tobacco users	76.2%

### TABLE 2. BIVARIATE PREDICTORS OF AWARENESS AND USE OF ELECTRONIC CIGARETTES

	Heard of Electronic Cigarettes	Has Tried Electronic Cigarettes	Past 30 Day Use of Electronic Cigarette
Overall	75.9%	12.6%	5.5%
Cigarette Smoking Status Never Smoker Former Smoker Current Smoker	71.3% 90.1% 80.7%	4.9% 15.6% 34.7%	1.9% 9.2% 14.5%
<b>Age</b> 18-29 30-44 45+	72.0% 76.7% 81.7%	17.1% 12.5% 5.9%	5.8% 6.4% 2.0%
Education Less than HS High School Some College College Degree	51.4% 82.5% 86.6% 78.8%	2.2% 16.7% 21.2% 6.5%	0.0% 6.2% 12.6% 0.5%
Race White, non-hispanic Black, non-hispanic Other, non-hispanic Hispanic	85.7% 81.6% 69.0% 69.0%	24.9% 6.3% 0.0% 7.3%	8.6% 2.3% 0.0% 5.5%
<b>Sex</b> Male (n=308) Female (n=407)	78.7% 74.4%	14.8% 10.9%	6.8% 4.6%
Region Northeast Midwest South West	82.0% 76.3% 79.1% 68.9%	12.9% 11.0% 10.9% 15.2%	3.1% 5.1% 6.7% 6.4%
<b>Income</b> Less than \$50,000 \$50,000+	76.2% 76.4%	10.7% 17.1%	5.5% 5.6%

# Inside the E-Cigarette RECHARGEABLE BATTERY 2. The atomiser heats up a nicotine solution to produce a vapor that can then be inhaled. 3. As someone draws on the e-cigarette, an LED light is also switched on by the processor, simulating a flame.

#### RESULTS

Of eligible panelists contacted, 88% completed the survey. 715 of these adults (22%) were parents Sample characteristics are presented in Table 1. Among parents, 13% had tried an electronic cigarette and 6% reported past 30 day use (see Table 2). Although use is higher among current smokers, 45% of parents who had tried electronic cigarettes and 49% of parents who report past 30 day use of electronic cigarettes are never or former smokers. Multivariable analyses are presented in Table 3. Ever users endorsed several reasons for using these products (see Table 4).

#### CONCLUSIONS

Many parents are using electronic cigarettes, and half of current users are never or former smokers.

Use of electronic cigarettes raises concerns about nonsmokers being at risk for nicotine dependence and current smokers maintaining their dependence.

The risks of exposure are unknown, yet many parents report using these electronic cigarettes to reduce harm to others. Greater awareness of the prevalence of use for these products and the high risk demographic user groups will inform efforts to determine appropriate public health policy and regulatory action. Future research should address cigarette use trajectories among smokers and nonsmokers who use electronic cigarettes and social influences on electronic cigarette use.

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