Beliefs about the *Potential Harms* and *Smoking Cessation Potential* of E-Cigarettes

Robert McMillen, PhD[1, 2]; Jonathan P. Winickoff, MD, MPH[1, 3]; Susanne Tanski, MD, MPH[1, 4]; Karen Wilson, MD, MPH[1, 5]; Jonathan Klein, MD, MPH[1]

( ) AAP Richmond Center ( ) Social Science Research Center, Mississippi State University; ( ) Center for Child and Adolescent Health Research and Policy, Massachusetts General Hospital for Children;
( ) Cancer Risk Behaviors Group, Norris Cotton Cancer Center, The Geisel School of Medicine at Dartmouth; ( ) Icahn School of Medicine at Mount Sinai

ABSTRACT

Background: While studies have shown that emissions from e-cigarettes contain various chemicals including nicotine, information about potential harms of e-cigarettes and possibility of benefits for smoking cessation is often conflicting. This study examines U.S. adults' beliefs about potential harms and benefits of e-cigarettes.

Methods: Using a nationally representative survey in 2015, we asked U.S. adults about beliefs regarding potential harms and smoking cessation potential of e-cigarettes. Respondents could agree, disagree, or report don't know in response to a set of statements about e-cigarettes. Chi-square analyses compared responses across smoking status, e-cigarette use, age, race, region, and education.

Results: Overall, 3,070 adults completed the survey. Most adults agreed that e-cigarette vapor is harmful to babies and children (57%), but more than a third (36%) reported that they didn't know. More than a third of adults believed that exhaled e-cigarette vapor contains nicotine (37%), exposes children to nicotine (44%), and deposits nicotine on indoor surfaces (37%), while approximately half of adults reported not knowing, (55%, 46%, 52%, respectively). Opinion about whether e-cigarettes help with smoking cessation was balanced, agree 43% disagree 44%, don't know 15%. Smokers, e-cigarette users, males, and less educated adults were the least likely to agree about harms of e-cigarettes, and most likely to agree that e-cigarettes can help with smoking cessation.

Conclusion: More adults agreed that e-cigarette that e- cigarette aerosols posed health risks than did not, but many adults were uncertain. With conflicting conclusions among scientists regarding the harms of e-cigarette emissions and the smoking cessation potential of e-cigarettes, many U.S. adults have conflicting beliefs about these products. Public health education strategies should address misconceptions about these products and educate smokers about non-aerosol producing, FDA-approved cessation therapies.

INTRODUCTION

- E-cigarettes are a rapidly evolving category of battery-operated devices that heat nicotine, flavor additives, and chemicals to the point of areolation.
- The science base on the short-term and long-term health effects of exposure to the e-cigarette aerosol is growing, and the initial findings indicate there is risk associated with exposure.
  - Given health concerns about exposure to secondhand aerosol, jurisdictions have started to include the prohibition of e-cigarette use in smoke free environments.
- Electronic cigarettes do **not** simply emit "harmless water vapor". Although it is common for people to refer to emissions from these products as vapor, these emissions are primarily a toxic aerosol. [1]
- Aerosol consists of submicron liquid droplets of the glycol which also contains many carcinogenic chemicals, such as formaldehyde, cadmium, lead, nickel, acetaldehyde, benzene, nicotine, toluene and nitrosamines. [2]
- People passively exposed to e-cigarettes aerosol absorb nicotine, with one study showing cotinine levels comparable to passive smokers, [3] indicating concern for children and adolescents, pregnant women, and non-smokers involuntarily to aerosolized nicotine.
- Nicotine from e-cigarettes can be deposited on various surfaces, [4] potentially leading to thirdhand exposure for babies and children.
- While studies have shown that emissions from e-cigarettes contain various chemicals including nicotine, information about potential harms of e-cigarettes and possibility of benefits for smoking cessation is often conflicting.
  - The evidence that e-cigarettes can help smokers to quit is inconclusive.
  - Although many cigarette smokers who have tried electronic cigarettes report doing so as a strategy for quitting smoking [5,6], the limited number of studies examining use of electronic cigarettes and cessation have either
    - found no evidence that electronic cigarettes are effective for cessation, [5,7]
    - found that use actually reduced the likelihood of successful cessation, [6,8,9], or
    - found that e-cigarettes were "modestly effective" in helping existing smokers who wanted to quit to quit, with verified quit rates of 7.3 percent vs. 5.8 percent for the nicotine patch. [10]
- This study examines U.S. adults' beliefs about potential harms and benefits of e-cigarettes.

METHODS

- Data are from the 2015 Social Climate Survey of Tobacco Control, a cross-sectional dual-frame survey administered to national probability samples of U.S. adults.
- The design included a Random Digit Dialing (RDD) frame and an internet panel frame developed from a probability sample of U.S. adults, in order to reduce non-coverage issues arising from wireless substitution.
- Respondents could agree, disagree, or report don't know in response to a set of statements about e-cigarettes.
  - E-Cigarette vapor is harmful to babies and children
  - Exhaled e-cigarette vapor contains nicotine
  - Smoking electronic cigarettes around children exposes them to nicotine
  - Using e-cigarettes indoors deposits nicotine on surfaces
  - E-cigarettes can help smokers to quit smoking
- Data were weighted to adjust for age, race, sex, and region.

ACKNOWLEDGEMENTS

FUNDED BY GRANTS FROM THE FLIGHT ATTENDANT MEDICAL RESEARCH INSTITUTE (FAMRI) AND THE TRUTH INITIATIVE TO THE AMERICAN ACADEMY OF PEDIATRICS JULIUS B. RICHMOND CENTER OF EXCELLENCE.

AMERICAN ACADEMY OF PEDIATRICS
Julius B. Richmond Center of Excellence

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

POSTER DESIGNED BY:
{MIRANDA ROBERTSON}

TABLE 1. DEMOGRAPHIC COMPARISONS

E-Cigarette vapor is harmful to babies & children	Agree	Don't Know
*Cigarette Smoking Status		
Current Smoker	48.5%	35.6%
Nonsmoker	58.2%	36.2%
E-Cigarette Use Status		
Current User	41.9%	31.9%
Non-User	58.1%	36.4%
Age		
18-24	68.9%	21.1%
25-44	58.1%	34.9%
45-64	53.3%	39.8%
65+	52.1%	43.6%
Race		
White	53.6%	39.2%
Black	60.2%	33.1%
Other	63.7%	30.4%
Education		
Less than HS	50.4%	35.4%
HS	57.2%	34.8%
Some College	54.1%	38.5%
College Degree	59.5%	35.8%
Sex		
Male	50.7%	40.0%
Female	62.4%	33.2%
Exhaled e-cigarette vapor contains nicotine	**Agree**	**Don't Know**
Cigarette Smoking Status		
Current Smoker	40.6%	44.6%
Nonsmoker	36.6%	56.7%
E-Cigarette Use Status		
Current User	37.0%	36.1%
Non-User	37.1%	56.6%
Age		
18-24	45.2%	43.2%
25-44	37.0%	54.9%
45-64	36.2%	55.3%
65+	32.4%	64.2%
Race		
White	34.3%	57.5%
Black	38.8%	53.3%
Other	43.6%	50.0%
Sex		
Male	37.6%	53.1%
Female	36.5%	57.1%
Smoking e-cigarettes around children exposes them to nicotine	**Agree**	**Don't Know**
Cigarette Smoking Status		
Current Smoker	41.2%	40.2%
Nonsmoker	44.9%	46.9%
E-Cigarette Use Status		
Current User	39.4%	30.8%
Non-User	44.8%	47.1%
Age		
18-24	52.4%	34.0%
25-44	43.4%	45.8%
45-64	43.4%	47.0%
65+	41.4%	54.3%
Race		
White	41.2%	49.4%
Black	50.6%	40.7%
Other	49.3%	39.9%
Education		
Less than HS	39.5%	43.9%
HS	45.4%	46.2%
Some College	44.6%	45.3%
College Degree	44.4%	47.1%
Sex		
Male	44.0%	44.8%
Female	44.7%	47.3%

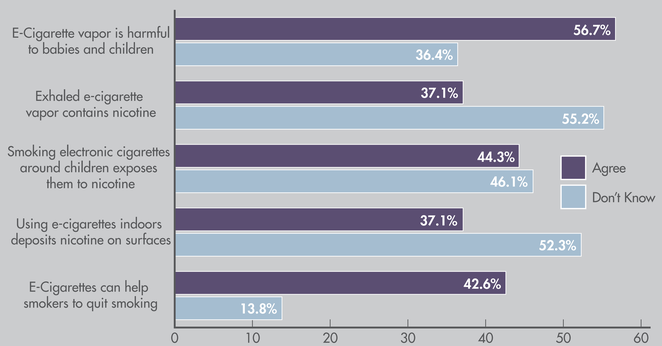
Using e-cigarettes indoors deposits nicotine on surfaces	Agree	Don't Know
Cigarette Smoking Status		
Current Smoker	35.3%	43.5%
Nonsmoker	37.4%	53.5%
E-Cigarette Use Status		
Current User	32.9%	32.8%
Non-User	37.4%	53.7%
Age		
18-24	43.8%	38.5%
25-44	35.7%	52.9%
45-64	36.8%	52.8%
65+	35.0%	59.9%
Race		
White	34.6%	55.6%
Black	41.4%	48.4%
Other	41.1%	45.4%
Education		
Less than HS	30.2%	52.7%
HS	25.5%	54.5%
Some College	40.4%	48.1%
College Degree	36.6%	54.1%
E-cigarettes can help smokers to quit smoking	**Agree**	**Don't Know**
Cigarette Smoking Status		
Current Smoker	57.9%	5.2%
Nonsmoker	40.4%	14.9%
E-Cigarette Use Status		
Current User	83.8%	1.4%
Non-User	39.8%	14.2%
Age		
18-24	52.8%	6.0%
25-44	46.1%	11.6%
45-64	41.6%	14.6%
65+	31.1%	20.9%
Race		
White	44.8%	14.8%
Black	39.6%	14.8%
Other	38.3%	10.4%
Education		
Less than HS	54.9%	4.4%
HS	43.4%	8.3%
Some College	43.4%	11.6%
College Degree	39.8%	19.1%
Sex		
Male	47.6%	39.3%
Female	37.9%	47.6%

* $p < .05$ for all comparisons.
Non-significant comparisons are not displayed.

LIMITATIONS

- Self-report data
- Internet panel survey may also have bias

BELIEFS ABOUT E-CIGARETTES



RESULTS

- 3,070 adults completed the survey. Weighted sample characteristics are presented in Table 1.
- Most adults agreed that e-cigarette vapor is harmful to babies and children (57%), but more than a third (36%) reported that they didn't know.
- More than a third of adults believed that exhaled e-cigarette vapor contains nicotine (37%), exposes children to nicotine (44%), and deposits nicotine on indoor surfaces (37%),
  - while approximately half of adults reported not knowing, (55%, 46%, 52%, respectively).
- Opinion about whether e-cigarettes help with smoking cessation was balanced, agree 43% disagree 44%, don't know 14%.
- Smokers, e-cigarette users, males, and less educated adults were the least likely to agree about harms of e-cigarettes, and most likely to agree that e-cigarettes can help with smoking cessation.

CONCLUSIONS

- More adults agreed that e-cigarette that e-cigarette aerosols posed health risks than did not, but many adults were uncertain.
- With conflicting conclusions among scientists regarding the harms of e-cigarette emissions and the smoking cessation potential of e-cigarettes, many U.S. adults have conflicting beliefs about these products.
- Public health education strategies should address misconceptions about these products and educate smokers about non-aerosol producing, FDA-approved cessation therapies.

REFERENCES

1. Offerman F. The Hazards of E-Cigarettes. *ASHRAE Journal*. 2014;2014(June). Available at: http://bookstore.ashrae.biz/journal/download.php?file=2014/June_038-047_IAQ_Offerman_rev.pdf. (clickable link)
2. Goniewicz ML, Knysak J, Gawron M, Kosmider L, Sobczak A, Kurek J, Prokopowicz A, Jablonska-Czapla M, Rosik-Dulewska C, and Havel C. Levels of selected carcinogens and toxicants in vapour from electronic cigarettes. *Tobacco control*. 2013.
3. Grana R, Benowitz N, and Glantz SA. E-cigarettes: a scientific review. *Circulation*. 2014;129(19):1972-86. doi:10.1161/CIRCULATIONAHA.114.007667.
4. Goniewicz ML, and Lee L. Electronic Cigarettes Are a Source of Thirdhand Exposure to Nicotine. *Nicotine Tob Res*. 2014. doi:10.1093/ntr/ntu152.
5. Adkison SE, O'Connor RJ, Bansal-Travers M, Hyland A, Borland R, Yong HH, Cummings KM, McNeill A, Thrasher JF, Hammond D, and Fong GT. Electronic nicotine delivery systems: international tobacco control four-country survey. *Am J Prev Med*. 2013;44(3):207-15. doi:10.1016/j.amepre.2012.10.018.
6. Vickerman KA, Carpenter KM, Altman T, Nash CM, and Zbikowski SM. Use of electronic cigarettes among state tobacco cessation quitline callers. *Nicotine Tob Res*. 2013;15(10):1787-91. doi:10.1093/ntr/ntt061.
7. Bullen C, McRobbie H, Thornley S, Glover M, Lin R, and Laugesen M. Effect of an electronic nicotine delivery device (e cigarette) on desire to smoke and withdrawal, user preferences and nicotine delivery: randomised cross-over trial. *Tob Control*. 2010;19(2):98-103. doi:10.1136/tc.2009.031567.
8. Grana RA, Popova L, and Ling PM. A Longitudinal Analysis of Electronic Cigarette Use and Smoking Cessation. *JAMA Intern Med*. 2014. doi:10.1001/jamainternmed.2014.187.
9. Popova L, and Ling PM. Alternative tobacco product use and smoking cessation: a national study. *Am J Public Health*. 2013;103(5):923-30. doi:10.2105/AJPH.2012.301070.
10. Bullen C, Howe C, Laugesen M, McRobbie H, Parag V, Williman J, and Walker N. Electronic cigarettes for smoking cessation: a randomised controlled trial. *Lancet*. 2013. doi:10.1016/S0140-6736(13)61842-5.