Effects of advertisements on smokers’ interest in trying e-cigarettes: the roles of product comparison and visual cues

Jessica K Pepper,1,2 Sherry L Emery,3 Kurt M Ribisl,1,2 Brian G Southwell,1,4,5 Noel T Brewer1,2

ABSTRACT

Introduction Electronic cigarettes (e-cigarettes) are battery-powered nicotine delivery devices that have become popular among smokers. We conducted an experiment to understand adult smokers’ responses to e-cigarette advertisements and investigate the impact of ads’ arguments and imagery.

Methods A US national sample of smokers who had never tried e-cigarettes (n=3253) participated in a between-subjects experiment. Smokers viewed an online advertisement promoting e-cigarettes using one of three comparison types (emphasising similarity to regular cigarettes, differences or neither) with one of three images, for nine conditions total. Smokers then indicated their interest in trying e-cigarettes.

Results Ads that emphasised differences between e-cigarettes and regular cigarettes elicited more interest than ads without comparisons (p<0.01), primarily due to claims about e-cigarettes’ lower cost, greater healthfulness and utility for smoking cessation. However, ads that emphasised the similarities of the products did not differ from ads without comparisons. Ads showing a person using an e-cigarette created more interest than ads showing a person without an e-cigarette (p<0.01).

Conclusions Interest in trying e-cigarettes was highest after viewing ads with messages about differences between regular and electronic cigarettes and ads showing product use. If e-cigarettes prove to be harmful or ineffective cessation devices, regulators might restrict images of e-cigarette use in advertising, and public health messages should not emphasise differences or satisfaction.21

INTRODUCTION

Electronic cigarettes, also called e-cigarettes or electronic nicotine delivery systems, are battery-powered devices that heat cartridges, which typically contain nicotine and humectants, to create a vapour that the user inhales. There are many varieties: disposable versus refillable, with or without nicotine, and flavoured (eg, menthol or chocolate) versus unflavoured. E-cigarettes are controversial. The scientific community is concerned about safety,4–6 the product’s use as a ‘gateway’ to other tobacco products and the possibility of renormalising smoking.3 At the same time, e-cigarettes are a non-combustible product that could meet some of the needs of nicotine-addicted smokers and thus hold the potential to be a valuable harm reduction tool for smokers who switch.6 Many e-cigarette users also claim that e-cigarettes helped them quit smoking.7–9 Longitudinal studies and large surveys are inconsistent in supporting this claim.10–12 The one randomised controlled trial that compared e-cigarettes with another nicotine replacement therapy did not find a difference between cessation rates for e-cigarettes versus the nicotine patch.12

Despite the controversy, e-cigarettes are increasingly popular. Use is particularly high among smokers,13–15 with 32% of smokers in 2012 and 50% of smokers in 2013 reporting having ever tried e-cigarettes.13 16 The glut of e-cigarette advertising could be contributing to e-cigarettes’ rise in popularity. Greater exposure to cigarette advertising predicts greater likelihood of smoking initiation.17 18 By extension, exposure to e-cigarette advertising may prompt people to start using e-cigarettes. Smokers appear to respond positively to such ads. In a recent study, two-thirds of smokers who watched a television ad for Blu e-cigarettes indicated interest in trying e-cigarettes after watching the ad, although this study did not use an experimental protocol or measure interest prior to exposure.19 While we cannot draw a causal inference, rates of use of e-cigarettes have risen13 15 20 in tandem with increases in e-cigarette advertising.21–23

Television, radio and print ads and other forms of e-cigarette marketing aimed at smokers often compare e-cigarettes with regular cigarettes.24 25 26 Ads describe e-cigarettes as newer, healthier, cheaper and easier to use in smoke-free situations, all reasons that e-cigarette users claim motivate their use.15 20 Advertisers also promote e-cigarettes as a cessation tool, although they often use indirect methods like affiliate marketing27 28 in order to avoid violating a 2010 US district court decision that blocked such claims.27 Some ads also highlight how e-cigarette use mimics the positive aspects of smoking regular cigarettes, that is, the social experience or satisfaction.21

Smokers’ responses to different ads may depend on how they view the comparison between the novel or innovative product (ie, e-cigarettes) and the traditional one (ie, regular cigarettes). Unique features of new nicotine products might be attractive in ways that will encourage use.29 Commentary and theory regarding the diffusion of innovation is useful in this regard as it suggests that adoption of a new technology is faster when the innovation embodies certain key characteristics.29 First, innovations that spread quickly have a relative advantage over the object they are replacing (eg,
METHODS
Sample
In March 2013, 17,522 US adult (age 18 or older) smokers and non-smokers completed an online survey as part of the Tobacco Control in a Rapidly Changing Media Environment study. Seventy-five per cent of respondents came from KnowledgePanel, a nationally representative online survey panel constructed using random digit dialling supplemented by address-based sampling to account for cell phone-only households. A convenience sample of adults who responded to online ads comprised the remaining 25%; the survey company screened their names and addresses, removed duplicates and quota matched to the probability sample based on demographics and tobacco use characteristics. Of the 34,097 KnowledgePanel members sampled, 61% completed the screening, and 97% of those who were eligible completed the online survey. Response rate data for the convenience samples are not available because there is no known sampling frame. For this study, we report data from current smokers (those who reported smoking every day or some days) who had never tried e-cigarettes (n=3253). All participants provided consent online before beginning the survey. Institutional review boards at the National Cancer Institute and the University of Illinois at Chicago approved the study.

Procedures
We randomly assigned participants to one of nine conditions in a 3×3 (image in ad)×3 (type of comparison) between-subjects factorial experiment. An advertising agency designed the ads (see sample ads in the online supplementary material) with a mock e-cigarette brand, ‘Evermist e-cigs’. The ad image showed a person using an e-cigarette (a woman using an e-cigarette with a red glowing tip), a rechargeable e-cigarette kit or no e-cigarette (a man looking at a laptop computer screen). Each ad had one of three headlines, which indicated a comparison type (difference, similarity or neither (ie, control)). The difference ads had the headline, “Better than a cigarette”, accompanied by one of four ad messages (costs less, use anywhere, healthier and helps to quit smoking) that emphasised the differences between the products. The similarity ads had the headline, “Just like a cigarette”, accompanied by one of three ad messages (feels the same as smoking, relieves your cravings and still smoke with friends) that emphasised the similarities between e-cigarettes and regular cigarettes. The control ads (no comparison) had the headline, “E-cigarettes”, accompanied by a message (great to use) that did not emphasise differences similarities or differences.

Measures
While viewing the ad, participants responded to the item, “How much does seeing this ad make you want to try e-cigarettes?” using a five-point scale (‘not at all’ (coded as 1), ‘a little bit’ (2), ‘a moderate amount’ (3), ‘quite a bit’ (4) and ‘a great deal’ (5)).

Data analysis
To check whether random assignment created demographically equivalent groups by comparison type (similarity, difference and control), we used χ² tests for categorical demographic variables (gender, education, race/ethnicity, employment status and annual household income) and ANOVA for continuous demographic variables (age, mean (SD) 49.6 (14.7), household income $74,999–$84,999 618 19.0, household income $84,999–$94,999 341 10.5, household income $94,999 or more 277 8.5).
interest in trying e-cigarettes. The interaction was not signi
ificant (p=0.20), we repeated the ANOVA model without the interaction term. We used a Bonferroni correction to adjust for multiple comparisons. We also used ANOVA to confirm that there was no interaction between the experimental manipulations and the sampling method (ie, whether the experimental findings differed for respondents recruited through convenience vs probability sampling) (p>0.05 for both interactions). For descriptive purposes, we conducted a linear regression to determine if interest in trying e-cigarettes varied by the specific comparison claims, advertisements elicited greater interest in trying e-cigarettes when they had messages stating that e-cigarettes differed from regular cigarettes because they were healthier than cigarettes (mean 2.12, p<0.01), were less expensive than cigarettes (2.09, p<0.05) or were helpful to quit smoking (2.06, p<0.05) as compared with the control message (1.89) (table 2). Interest in trying e-cigarettes was also higher when the ad stated that e-cigarettes were similar to cigarettes because they could be used with friends (2.09, p<0.05) compared with an advertisement with a control message. The other three experimental messages elicited equivalent interest as the control message.

Interest in trying e-cigarettes also varied by ad image (F (2,
3248)=6.95, p<0.01). Ads showing a person using an e-
cigarette (mean 2.15) created more interest than ads not showing an e-cigarette (mean 1.98, p<0.01), but there was no difference between ads showing an e-cigarette kit (mean 2.00) and ads not showing an e-cigarette (p>0.99) (figure 2).

**DISCUSSION**

Smokers expressed moderate interest in trying e-cigarettes after viewing the advertisements, but their level of interest varied as a function of comparison type, message and image. The type of promotional strategy used made a significant difference as to whether an e-cigarette ad generated interest among smokers. The depiction of people actually using the new product and e-cigarettes after viewing control ads and ads that emphasised similarity (mean 2.04, p=0.06).

As for the specific comparison claims, advertisements elicited greater interest in trying e-cigarettes when they had messages stating that e-cigarettes differed from regular cigarettes because they were healthier than cigarettes (mean 2.12, p<0.01), were less expensive than cigarettes (2.09, p<0.05) or were helpful to quit smoking (2.06, p<0.05) as compared with the control message (1.89) (table 2). Interest in trying e-cigarettes was also higher when the ad stated that e-cigarettes were similar to cigarettes because they could be used with friends (2.09, p<0.05) compared with an advertisement with a control message. The other three experimental messages elicited equivalent interest as the control message.

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**RESULTS**

The majority of participants were female (59%) and non-Hispanic white (77%) and had at least some college education (67%) and an annual household income less than $50 000 (62%) (table 1). About half (48%) were currently working, and the mean age was 50 years (SD 15 years). Fifty-one per cent intended to quit smoking in the next year and 14% more than 1 year from now, while 35% did not intend to quit smoking. Demographic characteristics of participants were equivalent across experimental conditions (all p>0.05, see online supplementary table S1).

Interest in trying e-cigarettes varied by comparison type (F (2,
3248)=3.94, p<0.025). One type of comparison ad generated effects on viewer interest: ads that emphasised the differences between cigarettes and e-cigarettes (mean interest 2.08) created more interest than control ads (mean 1.89, p<0.05) (table 2; figure 1). The other type of comparison ad did not generate such differences: smokers reported similar interest in trying e-cigarettes after viewing control ads and ads that emphasised similarity (mean 2.04, p=0.06).

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comparisons that emphasised differences between e-cigarettes and regular cigarettes appeared to have important effects.

Consistent with our prediction, interest was higher among respondents who viewed difference-focused ads compared with the control ad. As a relatively new entry to the US market, e-cigarettes are innovative tobacco products. Although both relative advantage and compatibility enhance the likelihood that an innovation will be adopted, the old product in this instance, namely, regular cigarettes, is stigmatised and unattractive. Indeed, most smokers want to quit. Thus, the innovative tobacco product was more attractive when framed as different from the original, while similarity messages had little or no impact.

The specific ad messages associated with the greatest amount of interest described e-cigarettes’ healthfulness, cost, use as a quit tool and the social experience of use. That responses to messages about health and cessation were more positive than responses to other messages is consistent with the literature, as e-cigarette users frequently report these as reasons for use. In prior survey research, e-cigarettes’ cost relative to cigarettes appears to motivate trying the product, although some users find the product to be more expensive than anticipated and may even discontinue use for this reason. Although the social experience of using with friends is not as frequently mentioned by current e-cigarette users, it may be that this factor created some of their initial interest in trying the product, as was found here, but did not impact their continued use.

That the message ‘relieves your cravings’ was unrelated to interest is not surprising as research on smokers’ subjective and objective experiences show large variability in e-cigarettes’ ability to deliver a satisfactory amount of nicotine. Smokers may be aware of this issue if they have discussed e-cigarettes with other smokers who have tried them. Indeed, smokers say that e-cigarette users are their most frequent source of information about the product. The message that e-cigarettes can be used anywhere was also not particularly attractive to smokers. This result could reflect a social desirability bias: perhaps smokers did not want to admit that they wish to skirt popular restrictions on smoking. The message that e-cigarettes are innovative tobacco products. Although both relative advantage and compatibility enhance the likelihood that an innovation will be adopted, the old product in this instance, namely, regular cigarettes, is stigmatised and unattractive. Indeed, most smokers want to quit. Thus, the innovative tobacco product was more attractive when framed as different from the original, while similarity messages had little or no impact.

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to design new ads, we were able to maintain the maximum amount of control when varying characteristics (eg, the ability to change the image without impacting other aspects of the layout). However, these new ads may not have matched the ‘feel’ or effectiveness of real-world ads. Future studies might incorporate real ads to increase the external validity of findings and also use ads with several images, including males using e-cigarettes. In our study, we could not conclude whether smokers were more interested in trying e-cigarettes when shown an image of a woman using an e-cigarette because they thought the specific woman depicted was attractive or because she was engaging in a smoking-like behaviour. We also did not explore non-smokers’ responses to the ads and did not include a ‘no ad’ condition to establish interest in trying e-cigarettes in the absence of an advertisement.

Finally, one critique of much work in research on communication is that intention to perform a behaviour does not necessarily lead to that behaviour. While the intention–behaviour gap is well documented in many areas, intentions remain a strong predictor of behaviour.55 Of course, we believe that this gap is not just message exposure anymore: a new paradigm for health media policy. In this study, the data are compelling and useful for future investigations of new e-cigarette marketing. The randomised design and large national sample are key strengths of the study.

E-cigarettes are a big—and rapidly growing—business. In 2013, sales of e-cigarettes were nearly $2 billion, and sales are likely to rise to $10 billion by 2017.56 Multinational tobacco companies are entering the e-cigarette market by buying existing companies or developing their own products. The involvement of these companies will likely increase the amount, reach and sophistication of e-cigarette advertising.21 22 24 and recent research suggests that exposure to e-cigarette advertising is associated with interest in trying the product.19 57 With the new evidence presented in this paper, it is clear that specific types of messages used to promote e-cigarettes are more effective in soliciting interest among current smokers who have yet to try e-cigarettes. Armed with such evidence, public health professionals can monitor e-cigarette marketing across a variety of channels and consider what claims and imagery regulations should address.

What this paper adds

- Although e-cigarette advertising is increasingly prevalent, little research has examined the impact of ads on interest in trying e-cigarettes.
- This experiment, based on the diffusion of innovations framework, found that ads depicting the use of e-cigarettes or including messages that emphasised the differences between regular and electronic cigarettes were associated with greater interest among adult smokers in trying e-cigarettes.
- Regulatory agencies may wish to restrict advertisements with features that elicit smokers’ interest in order to discourage e-cigarette use.

Contributors All authors conceptualised the design of the experiment. JKP and SLE collected the data. JKP analysed the data and wrote the initial manuscript with assistance from NTB. All authors provided substantive edits and approved the final version of the manuscript.

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Competing interests None.

Ethics approval IRB at University of Illinois at Chicago and at the National Cancer Institute.

Provenance and peer review Not commissioned; externally peer reviewed.

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Online Supplemental Material. Four of twenty-four advertisements used in the experiment.

Comparison type: difference. Image: no e-cigarette.


### Supplemental Table 1. Respondent characteristics by experimental condition.

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<tr>
<td>Male</td>
<td>244 (43.7%)</td>
<td>231 (42.1%)</td>
<td>212 (38.1%)</td>
<td>160 (40.5%)</td>
<td>167 (42.6%)</td>
<td>161 (41.1%)</td>
<td>58 (42.3%)</td>
<td>57 (39.3%)</td>
<td>57 (44.9%)</td>
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<tr>
<td>Female</td>
<td>315 (56.4%)</td>
<td>318 (57.9%)</td>
<td>345 (61.9%)</td>
<td>235 (59.5%)</td>
<td>225 (27.4%)</td>
<td>231 (58.9%)</td>
<td>79 (60.7%)</td>
<td>88 (60.7%)</td>
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<tr>
<td>Age, mean (SD)</td>
<td>49.3 (14.8)</td>
<td>49.9 (15.5)</td>
<td>49.5 (15.5)</td>
<td>48.9 (15.2)</td>
<td>50.1 (14.6)</td>
<td>49.8 (14.9)</td>
<td>49.3 (14.9)</td>
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<td>Education</td>
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<tr>
<td>Less than high school</td>
<td>32 (5.7%)</td>
<td>26 (4.7%)</td>
<td>34 (6.1%)</td>
<td>22 (5.6%)</td>
<td>19 (4.9%)</td>
<td>20 (5.1%)</td>
<td>9 (6.6%)</td>
<td>8 (5.5%)</td>
<td>4 (3.2%)</td>
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<tr>
<td>High school</td>
<td>147 (26.3%)</td>
<td>150 (27.3%)</td>
<td>161 (28.9%)</td>
<td>114 (28.9%)</td>
<td>105 (26.8%)</td>
<td>104 (26.5%)</td>
<td>104 (21.9%)</td>
<td>104 (33.1%)</td>
<td>38 (29.9%)</td>
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<tr>
<td>Some college</td>
<td>233 (41.7%)</td>
<td>243 (44.3%)</td>
<td>224 (40.2%)</td>
<td>165 (41.8%)</td>
<td>181 (46.2%)</td>
<td>161 (41.6%)</td>
<td>161 (41.6%)</td>
<td>161 (38.6%)</td>
<td>43 (33.9%)</td>
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<tr>
<td>Bachelor’s degree or higher</td>
<td>147 (26.3%)</td>
<td>130 (23.7%)</td>
<td>138 (24.8%)</td>
<td>94 (23.8%)</td>
<td>87 (22.2%)</td>
<td>107 (27.3%)</td>
<td>107 (29.9%)</td>
<td>107 (22.8%)</td>
<td>42 (33.1%)</td>
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<tr>
<td>Intention to quit smoking</td>
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<tr>
<td>In the next year</td>
<td>278 (49.7%)</td>
<td>295 (53.7%)</td>
<td>273 (49.0%)</td>
<td>212 (53.7%)</td>
<td>199 (50.8%)</td>
<td>197 (50.3%)</td>
<td>197 (50.4%)</td>
<td>197 (54.5%)</td>
<td>66 (52.0%)</td>
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<tr>
<td>More than 1 year from now</td>
<td>77 (13.8%)</td>
<td>75 (13.7%)</td>
<td>68 (12.2%)</td>
<td>54 (13.3%)</td>
<td>52 (13.3%)</td>
<td>51 (13.0%)</td>
<td>51 (16.1%)</td>
<td>51 (15.9%)</td>
<td>18 (14.2%)</td>
</tr>
<tr>
<td>Do not plan to quit</td>
<td>204 (36.5%)</td>
<td>179 (32.6%)</td>
<td>216 (38.8%)</td>
<td>129 (32.7%)</td>
<td>141 (36.0%)</td>
<td>144 (36.7%)</td>
<td>144 (33.6%)</td>
<td>144 (29.7%)</td>
<td>43 (33.9%)</td>
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<tr>
<td>Race/ethnicity</td>
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<tr>
<td>Non-Hispanic White</td>
<td>447 (80.0%)</td>
<td>408 (74.3%)</td>
<td>421 (75.6%)</td>
<td>302 (76.5%)</td>
<td>304 (77.6%)</td>
<td>301 (76.8%)</td>
<td>301 (78.1%)</td>
<td>301 (75.9%)</td>
<td>106 (83.5%)</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>38 (6.8%)</td>
<td>63 (11.5%)</td>
<td>59 (10.6%)</td>
<td>39 (9.9%)</td>
<td>40 (10.2%)</td>
<td>40 (9.5%)</td>
<td>40 (9.5%)</td>
<td>40 (9.5%)</td>
<td>10 (7.9%)</td>
</tr>
<tr>
<td>Category</td>
<td>29 (5.2%)</td>
<td>38 (6.9%)</td>
<td>31 (5.6%)</td>
<td>29 (7.3%)</td>
<td>25 (6.4%)</td>
<td>25 (6.4%)</td>
<td>9 (6.6%)</td>
<td>9 (6.2%)</td>
<td>4 (3.2%)</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Non-Hispanic, other or multiple races</td>
<td>45 (8.1%)</td>
<td>40 (7.3%)</td>
<td>46 (8.3%)</td>
<td>25 (6.3%)</td>
<td>23 (5.9%)</td>
<td>26 (6.6%)</td>
<td>8 (5.8%)</td>
<td>13 (5.5%)</td>
<td>7 (5.5%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>277 (49.6%)</td>
<td>263 (47.9%)</td>
<td>284 (51.0%)</td>
<td>185 (46.8%)</td>
<td>177 (45.2%)</td>
<td>171 (43.6%)</td>
<td>70 (51.1%)</td>
<td>77 (53.1%)</td>
<td>59 (46.5%)</td>
</tr>
<tr>
<td>Employment</td>
<td>61 (10.9%)</td>
<td>68 (12.4%)</td>
<td>60 (10.8%)</td>
<td>50 (12.7%)</td>
<td>52 (13.3%)</td>
<td>52 (13.3%)</td>
<td>14 (10.2%)</td>
<td>19 (33.1%)</td>
<td>17 (13.4%)</td>
</tr>
<tr>
<td>Not working: laid off or looking for work</td>
<td>221 (39.5%)</td>
<td>218 (39.7%)</td>
<td>213 (38.2%)</td>
<td>160 (40.5%)</td>
<td>163 (41.6%)</td>
<td>169 (43.1%)</td>
<td>53 (38.7%)</td>
<td>49 (33.8%)</td>
<td>51 (40.2%)</td>
</tr>
<tr>
<td>Not working: retired, disabled, or other</td>
<td>168 (30.1%)</td>
<td>180 (32.8%)</td>
<td>183 (32.9%)</td>
<td>115 (29.1%)</td>
<td>137 (35.0%)</td>
<td>127 (32.4%)</td>
<td>36 (26.3%)</td>
<td>45 (31.3%)</td>
<td>44 (34.7%)</td>
</tr>
<tr>
<td>Household income</td>
<td>163 (29.2%)</td>
<td>168 (30.6%)</td>
<td>158 (28.4%)</td>
<td>136 (34.4%)</td>
<td>118 (30.1%)</td>
<td>127 (32.4%)</td>
<td>38 (27.7%)</td>
<td>41 (28.3%)</td>
<td>33 (26.0%)</td>
</tr>
<tr>
<td>Less than $25,000</td>
<td>113 (20.2%)</td>
<td>115 (21.0%)</td>
<td>113 (20.3%)</td>
<td>69 (17.5%)</td>
<td>60 (15.4%)</td>
<td>66 (16.8%)</td>
<td>28 (20.4%)</td>
<td>34 (23.5%)</td>
<td>20 (15.8%)</td>
</tr>
<tr>
<td>$25,000 - $49,999</td>
<td>69 (12.3%)</td>
<td>47 (8.6%)</td>
<td>50 (9.0%)</td>
<td>36 (9.1%)</td>
<td>47 (12.0%)</td>
<td>41 (10.%)</td>
<td>20 (14.6%)</td>
<td>15 (10.3%)</td>
<td>16 (12.6%)</td>
</tr>
<tr>
<td>$50,000 - $74,999</td>
<td>46 (8.2%)</td>
<td>39 (7.1%)</td>
<td>53 (9.5%)</td>
<td>39 (7.7%)</td>
<td>30 (7.9%)</td>
<td>31 (11.0%)</td>
<td>15 (6.9%)</td>
<td>10 (11.0%)</td>
<td>14 (11.0%)</td>
</tr>
<tr>
<td>$75,000 - $99,999</td>
<td>69 (12.3%)</td>
<td>47 (8.6%)</td>
<td>50 (9.0%)</td>
<td>36 (9.1%)</td>
<td>47 (12.0%)</td>
<td>41 (10.%)</td>
<td>20 (14.6%)</td>
<td>15 (10.3%)</td>
<td>16 (12.6%)</td>
</tr>
<tr>
<td>$100,000 or more</td>
<td>46 (8.2%)</td>
<td>39 (7.1%)</td>
<td>53 (9.5%)</td>
<td>39 (7.7%)</td>
<td>30 (7.9%)</td>
<td>31 (11.0%)</td>
<td>15 (6.9%)</td>
<td>10 (11.0%)</td>
<td>14 (11.0%)</td>
</tr>
</tbody>
</table>

*Note:* Diff = difference, Sim = similarity, No EC = no electronic cigarette, EC kit = e-cigarette kit, EC user = woman using e-cigarette.