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Gender Differences in Use and Expectancies of E-Cigarettes: Online Survey Results

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Abstract

Introduction—Given the rapid increase in e-cigarette use, it is important to understand factors that may contribute to their initiation and maintenance. Because gender differences in tobacco use, product preferences, and expectancies are well established, similar gender differences may exist with e-cigarettes. The aim of this study was to identify gender differences among e-cigarette users in patterns of use, reasons for initiation and maintenance, and outcome expectancies regarding e-cigarettes.

Methods—Participants (N = 1815) completed an online survey from August through November, 2013. We assessed sociodemographics, smoking and e-cigarette history and use, and expectancies about e-cigarettes.

Results—We found gender differences in type of e-cigarette used, flavors used, nicotine dosage, source of information about e-cigarettes, place of purchase, and use of e-cigarettes where smoking is prohibited. In addition, males were more likely to report initiating e-cigarette use to quit smoking due to health concerns, whereas females were more likely to report initiation based on recommendations from family and friends. Males reported higher attributions for maintenance of e-cigarette use related to positive reinforcement (enjoyment), whereas females reported higher

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Contributors

THB, VNS, MU, and LRM designed the study and wrote the protocol and survey. BP, PTH, NSM, JBC conducted literature searches and provided summaries of previous research. BP, PTH, NSM, and JBC conducted statistical analysis. BP wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of interest

Thomas H. Brandon receives research support from Pfizer, Inc. The authors alone are responsible for the content and writing of the article.

negative reinforcement attributions (stress reduction or mood management). Males reported more positive expectancies about e-cigarettes, including taste, social facilitation, and energy, whereas women rated e-cigarettes higher for weight control. Males also reported greater addiction-related e-cigarette expectancy than females.

Conclusions—Many of the gender differences with e-cigarettes parallel those previously found with traditional cigarette smoking. Although effect sizes associated with these differences were small, the results may help advance research and intervention development with respect to e-cigarette initiation, maintenance and cessation.

Keywords

electronic cigarettes; gender differences; expectancies; online survey; cigarettes

1. Introduction

Electronic cigarettes (e-cigarettes), also called electronic nicotine delivery systems (ENDS), are battery-operated devices that deliver nicotine via inhaled vapor. Although there is heterogeneity in e-cigarette product characteristics, the common feature across devices is an electrically powered heating element that converts liquid containing nicotine, humectants, and flavorings into inhalable vapor (Benowitz & Goniewicz, 2013). Many brands of e-cigarettes resemble a conventional cigarette in multiple ways, including appearance, method of inhalation, and production of smoke-like aerosol vapor that is exhaled. However, e-cigarettes do not require combustion of tobacco and its toxic constituents (Benowitz & Goniewicz, 2013).

Awareness and use of e-cigarettes has increased considerably in the last few years among U.S. adults, particularly those who are current or former smokers (King, Patel, Nguyen, & Dube, 2015; Pepper & Brewer, 2014). Due to the exponential growth in awareness and use of these devices, it is important to explore factors that may promote initiation and maintenance of e-cigarette use over time. Specifically, the American Association for Cancer Research and the American Society of Clinical Oncology identified “understanding the perception and patterns of ENDS use” as a key research goal in their joint policy statement (Brandon et al., 2015).

Accordingly, a burgeoning area of research involves perceptions and beliefs (expectancies) regarding e-cigarettes. E-cigarettes have been used by adult smokers because of generally positive perceptions regarding the safety of these devices and their ability to be used to stop smoking tobacco cigarettes (Etter & Bullen, 2011; Goniewicz, Lingas, & Hajek, 2013; Harrell et al., 2015; Zhu, Gams, Lee, Cummins, Yin, & Zoref, 2013). These perceptions of e-cigarettes provide a glimpse into the primary reported reasons why a growing number of cigarette smokers use e-cigarettes as a way to reduce or quit cigarette smoking (Etter & Bullen, 2011; Goniewicz et al., 2013; Zhu et al., 2013). However, a significant proportion of smokers who have tried e-cigarettes continue to smoke traditional, combustible cigarettes (Etter & Bullen, 2014; Giovenco, Lewis, & Delnevo, 2014). Therefore, exploring more nuanced factors associated with e-cigarette and cigarette use could elucidate differences

between those who reduce or quit smoking using e-cigarettes and those who concurrently use both products (often referred to as “dual users”).

Tobacco companies have viewed women as a key US consumer base since 1920 (Fielding, 1987) and developed products such as long and ultra-long cigarettes to appeal to women by eliciting feelings of independence, liberation, slimness, success, glamor, and taste (Carpenter, Wayne, & Connolly, 2005; Hammond, Doxey, Daniel, & Bansal-Travers, 2011). More recently, distributors of e-cigarettes are beginning to use similar strategies to target female users (Richardson, Ganz, Stalgaitis, Abrams, & Vallone, 2014) with some e-cigarette distributors selling slim, pink, glamorous, and fashionable devices (Yao, Jiang, Grana, Ling, & Glantz, 2014).

There is a large body of literature describing gender differences in tobacco use and tobacco products, including differences in reasons for tobacco use (Perkins, Donny, & Caggiula, 1999; Perkins et al., 2001; Perkins, Jacobs, Sanders, & Caggiula, 2002; Westmaas & Langsam, 2005) smoking-related expectancies (Brandon & Baker, 1991; Copeland, Brandon, & Quinn, 1995), and success at quitting smoking (Perkins & Scott, 2008; Scharf & Shiffman, 2004; Wetter et al., 1999). In contrast, most preliminary evidence has found no clear association between e-cigarette use and gender, particularly among online samples (Hajek, Etter, Benowitz, Eissenberg, & McRobbie, 2014). However, other studies have found gender differences in prevalence and e-cigarette preferences. For instance, Zhu et al. (2013) reported that female current smokers were more likely to have tried e-cigarettes than males (38% vs. 27%), whereas Dawkins, Turner, Roberts, and Soar (2013) found that females preferred sweet flavors of e-cigarette liquids and brands that closely resembled tobacco cigarettes in appearance, preferences that corresponded to more positive perceptions of taste and their ability to reduce nicotine cravings. Taken together, these mixed findings suggest that more exploration into the role of gender in e-cigarette use is warranted.

Given that gender differences in tobacco use, tobacco products, and smoking expectancies have been well-recognized and established (Brandon & Baker, 1991, Eriksen, Mackay, & Ross, 2012; Grunberg, Winders, Wewers, 1991; Perkins et al., 1999) it is possible that similar gender differences in e-cigarette use and in expectancies about e-cigarettes may exist and could play an important role in e-cigarette initiation, maintenance of e-cigarette use, and discontinuation of smoking traditional, combustible cigarettes. Previous research has found that the smoking behavior of women, compared to men, appears to be influenced less by nicotine per se and more by non-nicotine factors, including social and environmental cues. With respect to tobacco use itself, women tend to smoke fewer cigarettes per day than men, inhale less deeply, and prefer brands with lower nicotine and tar. Additionally, women hold stronger outcome expectancies about smoking for mood-management and weight and appetite control.

The aim of the current study was to examine gender differences across multiple domains of e-cigarette use. We expected to find gender differences in patterns of use, reasons for use, and expectancies about e-cigarettes. With respect to expectancies specifically, we expected to find gender differences that parallel those found in expectancies for traditional cigarettes,

including expectancies related to weight control, mood management, social facilitation, and addiction (Brandon & Baker, 1991; Copeland et al., 1995).

2. Methods

2.1. Participants

The sample comprised 1815 e-cigarette users ("vapers") who completed an online survey from August through November, 2013. Participants were eligible if they were at least 18 years old, were able to understand and read English, reported a history of daily smoking, had smoked tobacco cigarettes for at least one year, and had used e-cigarettes in the past month. From an initial sample of 2271 survey respondents, 91 cases were deleted for being from the same IP address, 130 were blank, 50 were respondents that indicated they had not smoked 100 or more cigarettes in their lifetime, and 185 did not complete all the expectancy questions.

Other results from this sample have been reported previously (Harrell et al., 2015).

2.2. Measures

The online survey was developed by the authors and consisted of five sections assessing the variables listed below.

2.2.1. Sociodemographic variables—Age, gender, race, education, income, and marital status.

2.2.2. Smoking history—Participants answered a series of questions about their current or past use of tobacco cigarettes. Participants who reported using tobacco cigarettes in the past 30 days were categorized as dual users; that is, users of both tobacco cigarettes and e-cigarettes (n = 381). The remaining participants, who reported smoking no tobacco cigarettes in the past month were categorized as e-cigarette users (n = 1434).

2.2.3. E-cigarette history—Participants answered several questions about their e-cigarette use, including date of initiation; frequency of use; characteristics of e-cigarettes currently using (brands, flavors of e-liquids, and nicotine concentrations of e-liquids); places of use; source of information about e-cigarettes; place of purchase; and, whether they participated in online e-cigarettes forums.

2.2.4. Expectancies for e-cigarettes—E-cigarette expectancies items were created based on prior research, as described elsewhere (Harrell et al., 2015). Items were adapted from the Smoking Consequences Questionnaire-Adult (SCQ-A; Copeland et al., 1995) and assessed expectancies for negative affect reduction, stimulation/state enhancement, health risk, taste/sensorimotor manipulation, social facilitation, weight control, craving/addiction (specifically craving reduction), negative physical feelings (focused on mouth and throat), and negative social impression. Items were chosen based on factor loadings on the SCQ-A and their ability to be adapted for e-cigarettes. Participants also rated the degree to which they experienced e-cigarette cravings and withdrawal symptoms when they abstain, and the degree to which they felt e-cigarettes helped with stress reduction, provided satisfaction, and

were addictive. An additional two questions assessed convenience and cost. All items were rated on a 7-point scale from 1 “strongly disagree” to 7 “strongly agree.”

2.2.5. Reasons for using e-cigarettes—Participants answered several questions about their reasons for starting and continuing e-cigarettes. They were presented lists of potential reasons and instructed to select all that applied.

2.3. Procedure

The online survey was publicized via local press, which let to postings on social media and online e-cigarette forums. Participants provided electronic informed consent before beginning the survey and were not compensated. The survey was anonymous and took approximately 15 minutes to complete.

2.4. Data Analysis

Descriptive analyses were conducted with the final sample (N = 1815). Gender differences in sociodemographic variables, smoking history, e-cigarette use, and reasons for e-cigarette use were examined with chi squared tests, and gender differences in expectancies for e-cigarettes were examined with t-tests. Given the large sample size, the tables include Cramer's V effect size for significant chi-squared results, and Cohen's d for significant gender effects on expectancy variables. Cramer's V range labels were small: (≤ 0.2), medium (0.3-0.5), and large (≥ 0.6); and Cohen's d ranges were labeled as small: (≤ 0.4), medium (0.5-0.7), and large (≥ 0.8) (Cohen, 1988).

3. Results

3.1. Participant Characteristics

The sample of 1,815 e-cigarette users included 1212 males (66.8%) and 603 females (33.2%), with a mean age of 39.82 years (SD = 13.10). Table 1 presents sociodemographic and tobacco smoking characteristics for the sample as a whole, as well as by gender. Compared to men, women were older and more likely to be, white or Caucasian, married or widowed, and to report annual household income under $40,000. Women were more likely than men to have started smoking tobacco cigarettes before age 16 and to have smoked more than 20 cigarettes per day before quitting.

3.2. Characteristics of E-Cigarettes Use

There were gender differences observed in patterns/characteristics of use including: e-cigarette type used (disposable vs. non-disposable), flavor used (tobacco vs. non-tobacco), nicotine dosage used, brands used (first or second generation), source of information, place of purchase, participation in forums, and use of e-cigarettes in places where smoking tobacco is prohibited (see Table 2). Compared to men, women were more likely to report using disposable e-cigarettes, non-tobacco flavors, lower nicotine doses, and first generation brands of e-cigarettes. Moreover, women were more likely than men to report getting information about e-cigarettes from friends/family, TV media/advertisements, and gas station/cigarette stores, whereas men were more likely to report getting information about e-

cigarettes from on-line forums. Men were also more likely to report using e-cigarettes in places where smoking tobacco is not allowed, including both at home and work.

3.3. Reasons for Using E-Cigarettes

Gender differences also emerged on reasons for initiating and continuing e-cigarette use. Males more frequently reported starting e-cigarettes for the following reasons: to help them quit smoking combustible cigarettes (86.1% vs. 81.1%; $p < .01$, $V = 0.08$), due to health concerns associated with combustible cigarettes (77.5% vs. 70.3%; $p < .01$, $V = 0.08$), and because they were curious about them (36.0% vs. 27.9%; $p < .001$, $V = 0.08$). Females more frequently reported initiating e-cigarettes based on recommendations from friends and family (26.7% vs. 37.1%; $p < .001$, $V = 0.11$) (Figure 1).

Compared to females, males reported continuing to use e-cigarettes because they held the perception that e-cigarettes helped reduce cigarette use (18.2% vs. 12.3%; $p < .001$, $V = 0.08$), they had health concerns associated with combustible cigarettes (69.5% vs. 63.5%; $p < .05$, $V = 0.06$), and they enjoyed the taste of e-cigarettes (positive reinforcement) (75.7% vs. 67.5%; $p < .001$, $V = 0.09$). Females reported continuing to use e-cigarettes to deal with stress or to control moods (negative reinforcement) to a greater extent than males (46.3% vs. 40.4%; $p < .05$, $V = 0.06$) (Figure 2).

3.4. Expectancies for E-Cigarettes

As shown on Figure 3 gender differences also emerged on reported e-cigarette expectancies (beliefs about outcomes of use). Males reported more positive expectancies than females, including good taste [M = 6.51 ($SD = 0.96$), M = 6.40 ($SD = 1.11$); $p < .05$, $d = 0.11$], social facilitation [M = 4.15 ($SD = 1.78$), M = 3.94 ($SD = 1.98$); $p < .05$, $d = 0.11$], and increased energy as a result of e-cigarettes use [M = 3.96 ($SD = 1.58$), M = 3.77 ($SD = 1.68$); $p < .05$, $d = 0.12$]. However, males reported holding greater negative expectancies that e-cigarettes are addictive [M = 4.49 ($SD = 1.64$), M = 4.20 ($SD = 1.67$); $p < .001$, $d = 0.15$]. The only expectancy that emerged higher for women was the positive expectancy of weight control [M = 3.93 ($SD = 1.68$), M = 4.11 ($SD = 1.85$); $p < .05$, $d = 0.10$].

4. Discussion

Overall, although the effect sizes of gender differences were small, results revealed several significant differences in patterns of use, reasons for using, and e-cigarette expectancies that warrant further study. Males to a greater extent use e-cigarette as a tool for helping them to quit smoking tobacco cigarettes, due to health concerns associated with combustible cigarettes, and because they enjoy the taste of e-cigarettes. On the other hand, females reported using e-cigarettes based on recommendations from friends/family, and for dealing with stress or controlling their moods.

Results show that females were more likely to use first generation devices, which was also reported by Dawkins et al. (2013). First generation brands are devices that closely resemble tobacco cigarettes, and there is evidence that the smoking behavior of women may be more influenced by non-nicotine stimuli associated with smoking, such as the look, touch and feel of cigarettes (Perkins et al., 1999; Perkins et al., 2001). Also, previous reports suggested the

importance of sensorimotor aspects of smoking in women (Barrett, 2010). Conversely, males more frequently reported using second-generation devices. This may be related to the evidence that men may be more sensitive to nicotine dosing (Perkins & Karelitz, 2015; Perkins et al., 1999; Perkins et al., 2001). Because second-generation brands deliver nicotine more efficiently (Farsalinos et al., 2014) male users may prefer these products. This may also contribute males holding greater expectancies that e-cigarettes are addictive. These findings suggest that it will be important to study whether e-cigarettes contribute to or maintain nicotine addiction in males to a greater degree than in females. Although most participants in the online survey reported initiating e-cigarettes to help them quit smoking, consistent with several previous studies (Dawkins et al., 2013; Etter & Bullen, 2011; Goniewicz et al., 2013; Zhu et al., 2013) females were more likely than males to report initiating e-cigarettes after receiving information and recommendations from friends and family. This suggests that females may be more responsive to social influence surrounding e-cigarette use, which is consistent with previous research on tobacco cigarettes indicating that woman's behavior is more influenced by environmental stimuli (Perkins, 1996). Women were also more likely to report learning about e-cigarettes from media and TV advertisements, which suggests that women may be more vulnerable to messages from e-cigarette distributors claiming benefits of e-cigarettes with respect to health and weight control, and self-image. Recent research shows that e-cigarettes distributors may have already caught onto this, as some brands are being specifically marketed to women (Richardson et al., 2014; Yao et al., 2014). This raises concerns about how e-cigarettes may facilitate initiation of nicotine use among women. Future research into the impact of these messages on e-cigarette use is critical.

Our results revealed that males reported greater maintenance of e-cigarette use due to positive reinforcement (taste), whereas females attributed continued use more to negative reinforcement (stress reduction or mood management). These findings are consistent with expectancy research on traditional cigarettes, in which men were less likely to smoke in response to negative affect or believe that smoking can relieve negative affect, as compared to women (Brandon & Baker, 1991) as well as research indicating that females are more reactive to stress cues (Wray et al., 2015). In fact, reduction of negative affect is one of the most commonly reported reasons for smoking maintenance among women (Copeland et al., 1995), and could be an important reason for maintaining e-cigarette use in females.

Our findings show that females reported greater positive expectancies that e-cigarettes facilitate weight control. This finding is also in line with previous studies with traditional cigarettes that have demonstrated that women tend to initiate smoking for weight control reasons and have stronger beliefs regarding the appetite suppressing properties of nicotine when compared to men (Copeland et al., 1995). In fact, expectancies regarding appetite and weight reduction from smoking have been found to be important motivating factors for smoking among females (Brandon & Baker, 1991).

Certain limitations should be considered when interpreting these results. First, because the sample consisted of respondents to an online survey, results need to be interpreted with caution. As there is evidence that internet surveys primarily attract e-cigarettes users that are enthusiastic about this product (Etter & Bullen, 2011), it is possible that smokers who had

less success with e-cigarettes were also less likely to complete the survey, and these samples could also be vulnerable to over-representing men (Dawkins et al., 2013; Siegel, Tanwar, & Wood, 2011). Therefore, future studies should investigate gender differences among e-cigarette users in a general population-based sample. Second, although we found many statistically significant gender differences, effect sizes associated with these differences were small. Thus, the results may have more theoretical than applied significance. Third, the data were cross-sectional, which limits inferences regarding the temporal order of the associations we examined. Prospective, longitudinal investigations and experimental studies are needed to inform causality. Fourth, survey respondents were primarily from the United States, and these results may not apply elsewhere.

Despite these limitations, the current study reports novel findings that should stimulate further research into gender differences in e-cigarettes use. Our results indicate that gender differences in e-cigarette use and expectancies parallel previously-established gender differences in cigarette use and expectancies for smoking. Men appear to use e-cigarettes more for nicotine, whereas women use more for non-nicotine related reasons (social influence, appearance, weight control, and dealing with stress and mood). A better understanding of such differences can provide valuable information about mechanisms involved in the initiation and maintenance of e-cigarettes use, as well as avenues to explore for encouraging smoking cessation among dual users, and perhaps eventual cessation of e-cigarette use as well. This study underscores the need for examining and comparing the trajectories of expectancies among male and female e-cigarette users as they gain more experience with e-cigarettes use. Future studies should examine whether the observed gender differences in e-cigarettes use and expectancies are predictive of smoking cessation and/or e-cigarette cessation.

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References

Barrett SP. The effects of nicotine, denicotinized tobacco, and nicotine-containing tobacco on cigarette craving, withdrawal, and self-administration in male and female smokers. Behavioural Pharmacology. 2010; 21:144–152. doi: 10.1097/FBP.0b013e328337be68. [PubMed: 20168213]

Benowitz NL, Goniewicz ML. The regulatory challenge of electronic cigarettes. Journal of the American Medical Association. 2013; 310:685–686. doi: 10.1001/jama.2013.109501. [PubMed: 23856948]

Brandon TH, Baker TB. The Smoking Consequences Questionnaire: The subjective expected utility of smoking in college students. Psychological Assessment. 1991; 3:484–491. doi: 10.1037/1040-3590.3.3.484.

Brandon TH, Goniewicz ML, Hanna NH, Hatsukami D, Herbst RS, Hobin JA, Warren WG. Electronic nicotine delivery systems: A policy statement from the American Association for Cancer Research

and the American Society of Clinical Oncology. Clinical Cancer Research. 2015; 21:514–525. doi: 10.1158/1078-0432.CCR-14-2544. [PubMed: 25573384]

Carpenter CM, Wayne GF, Connolly GN. Designing cigarettes for women: New findings from the tobacco industry documents. Addiction. 2005; 100:837–851. doi: 10.1111/j.1360-0443.2005.01072.x. [PubMed: 15918814]

Cohen, J. Statistical power analysis for the behavioral sciences. Erlbaum; Hillsdale, NJ: 1988.

Copeland AL, Brandon TH, Quinn EP. The Smoking Consequences Questionnaire-Adult: Measurement of smoking outcome expectancies of experienced smokers. Psychological Assessment. 1995; 7:484–494. doi:10.1037/1040-3590.7.4.484.

Dawkins L, Turner J, Roberts A, Soar K. 'Vaping' profiles and preferences: An online survey of electronic cigarette users. Addiction. 2013; 108:1115–1125. doi:10.1111/add.12150. [PubMed: 23551515]

Eriksen, M.; Mackay, J.; Ross, H. The tobacco atlas. 4th ed. World Lung Foundation; Atlanta, GA: 2012. http://tobaccoatlas.org. [February, 4, 2015]

Etter JF, Bullen C. Electronic cigarette: Users profile, utilization, satisfaction and perceived efficacy. Addiction. 2011; 106:2017–2028. doi: 10.1111/j.1360-0443.2011.03505.x. [PubMed: 21592253]

Etter JF, Bullen C. A longitudinal study of electronic cigarette users. Addictive Behaviors. 2014; 39:491–494. doi: 10.1016/j.addbeh.2013.10.028. [PubMed: 24229843]

Farsalinos KE, Spyrou A, Tsimopoulou K, Stefopoulos C, Romagna G, Voudris V. Nicotine absorption from electronic cigarette use: comparison between first and new-generation devices. Scientific Reports. 2014; 4:4133. doi: 10.1038/srep04133. [PubMed: 24569565]

Fielding JE. Smoking and women: Tragedy of the majority. New England Journal of Medicine. 1987; 317:1343–1345. doi: 10.1056/NEJM198711193172108. [PubMed: 3683463]

Giovenco DP, Lewis MJ, Delnevo CD. Factors associated with e-cigarette use: A national population survey of current and former smokers. American Journal of Preventive Medicine. 2014; 47:476–480. doi: 10.1016/j.amepre.2014.04.009. [PubMed: 24880986]

Goniewicz ML, Lingas EO, Hajek P. Patterns of electronic cigarette use and user beliefs about their safety and benefits: An internet survey. Drug and Alcohol Review. 2013; 32:133–140. doi: 10.1111/j.1465-3362.2012.00512.x. [PubMed: 22994631]

Grunberg NE, Winders SE, Wewers ME. Gender differences in tobacco use. Health Psychology. 1991; 10:143–153. doi:10.1037/0278-6133.10.2.143. [PubMed: 2055212]

Hajek P, Etter JF, Benowitz N, Eissenberg T, McRobbie H. Electronic cigarettes: Review of use, content, safety, effects on smokers and potential for harm and benefit. Addiction. 2014; 109:1801–1810. doi: 10.1111/add.12659. [PubMed: 25078252]

Hammond D, Doxey J, Daniel S, Bansal-Travers M. Impact of female-oriented cigarette packaging in the United States. Nicotine & Tobacco Research. 2011; 13:579–588. doi: 10.1093/ntr/ntr045. [PubMed: 21486994]

Harrell PT, Marquinez NS, Correa JB, Meltzer LR, Unrod M, Sutton SK, Brandon TH. Expectancies for cigarettes, e-cigarettes, and nicotine replacement therapies among e-cigarette users (aka vapers). Nicotine & Tobacco Research. 2015; 17:193–200. doi: 10.1093/ntr/ntu149. [PubMed: 25168035]

King BA, Patel R, Nguyen KH, Dube SR. Trends in awareness and use of electronic cigarettes among U.S. adults, 2010-2013. Nicotine & Tobacco Research. 2015; 17:219–227. doi: 10.1093/ntr/ntu191. [PubMed: 25239961]

Pepper JK, Brewer NT. Electronic nicotine delivery system (electronic cigarette) awareness, use, reactions and beliefs: A systematic review. Tobacco Control. 2014; 23:375–384. doi: 10.1136/tobaccocontrol-2013-051122. [PubMed: 24259045]

Perkins KA. Sex differences in nicotine versus nonnicotine reinforcement as determinants of tobacco smoking. Experimental and Clinical Psychopharmacology. 1996; 4:166–177. doi: 10.1037//1064-1297.4.2.166.

Perkins KA, Donny E, Caggiula AR. Sex differences in nicotine effects and self-administration: Review of human and animal evidence. Nicotine & Tobacco Research. 1999; 1:301–315. doi: 10.1080/14622299050011431. [PubMed: 11072427]

Perkins KA, Gerlach D, Vender J, Grobe J, Meeker J, Hutchison S. Sex differences in the subjective and reinforcing effects of visual and olfactory cigarette smoke stimuli. Nicotine & Tobacco Research. 2001; 3:141–150. doi: 10.1080/14622200110043059. [PubMed: 11403728]

Perkins KA, Jacobs L, Sanders M, Caggiula AR. Sex differences in the subjective and reinforcing effects of cigarette nicotine dose. Psychopharmacology (Berl). 2002; 163:194–201. doi: 10.1007/s00213-002-1168-1. [PubMed: 12202966]

Perkins KA, Karelitz JL. Sex differences in acute relief of abstinence-induced withdrawal and negative affect due to nicotine content in cigarettes. Nicotine & Tobacco Research. 2015; 17:443–448. doi: 10.1093/ntr/ntu150. [PubMed: 25762754]

Perkins KA, Scott J. Sex differences in long-term smoking cessation rates due to nicotine patch. Nicotine Tob Res. 2008; 10(7):1245–1250. doi: 10.1080/14622200802097506. [PubMed: 18629735]

Richardson A, Ganz O, Stalgaitis C, Abrams D, Vallone D. Noncombustible tobacco product advertising: How companies are selling the new face of tobacco. Nicotine & Tobacco Research. 2014; 16:606–614. doi: 10.1093/ntr/ntt200. [PubMed: 24379146]

Scharf D, Shiffman S. Are there gender differences in smoking cessation, with and without bupropion? Pooled- and meta-analyses of clinical trials of Bupropion SR. Addiction. 2004; 99:1462–1469. doi: 10.1111/j.1360-0443.2004.00845.x. [PubMed: 15500599]

Siegel MB, Tanwar KL, Wood KS. Electronic cigarettes as a smoking-cessation: Tool results from an online survey. American Journal Preventive Medicine. 2011; 40:472–475. doi: 10.1016/j.amepre.2010.12.006.

Westmaas JL, Langsam K. Unaided smoking cessation and predictors of failure to quit in a community sample: Effects of gender. Addictive Behaviors. 2005; 30:1405–1424. doi: 10.1016/j.addbeh.2005.03.001. [PubMed: 15896921]

Wetter DW, Kenford SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. Journal of Consulting and Clinical Psychology. 1999; 67:555–562. doi: 10.1037/0022-006X.67.4.555. [PubMed: 10450626]

Wray JM, Gray KM, McClure EA, Carpenter MJ, Tiffany ST, Saladin ME. Gender differences in responses to cues presented in the natural environment of cigarette smokers. Nicotine & Tobacco Research. 2015; 17:438–442. doi: 10.1093/ntr/ntu248. [PubMed: 25762753]

Yao T, Jiang N, Grana R, Ling PM, Glantz SA. A content analysis of electronic cigarette manufacturer websites in China. Tobacco Control. 2014 doi: 10.1136/tobaccocontrol-2014-051840.

Zhu SH, Gamst A, Lee M, Cummins S, Yin L, Zoref L. The use and perception of electronic cigarettes and snus among the U.S. population. Plos One. 2013; 8:e79332. doi: 10.1371/journal.pone.0079332. [PubMed: 24250756]

Highlights

- Gender differences in e-cigarette use and expectancies tended to be small
- Females were more likely to initiate e-cigarette use due to social influence
- Females tended to use e-cigarettes more for mood-management and weight control
- Males, compared to females, rated e-cigarettes as more addictive
- Gender differences in e-cigarette use were similar to those reported for cigarettes

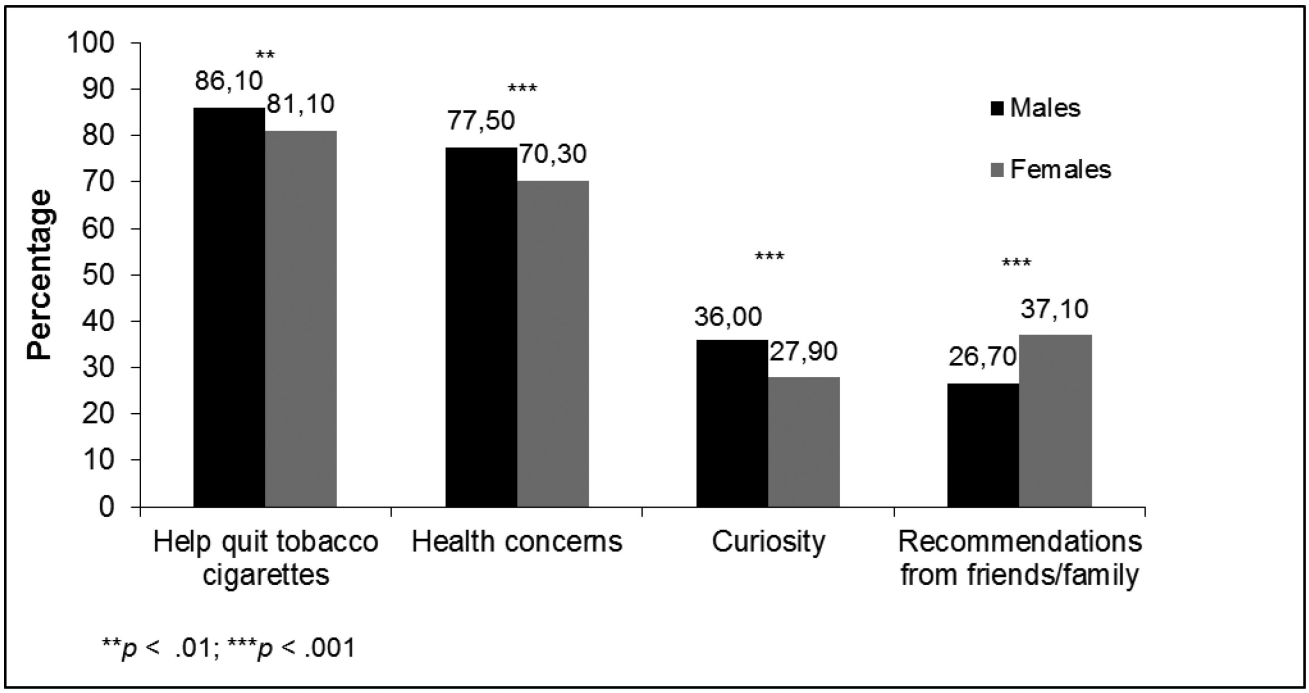

Figure 1.
Gender differences in reasons for initiating e-cigarettes use (N = 1815).

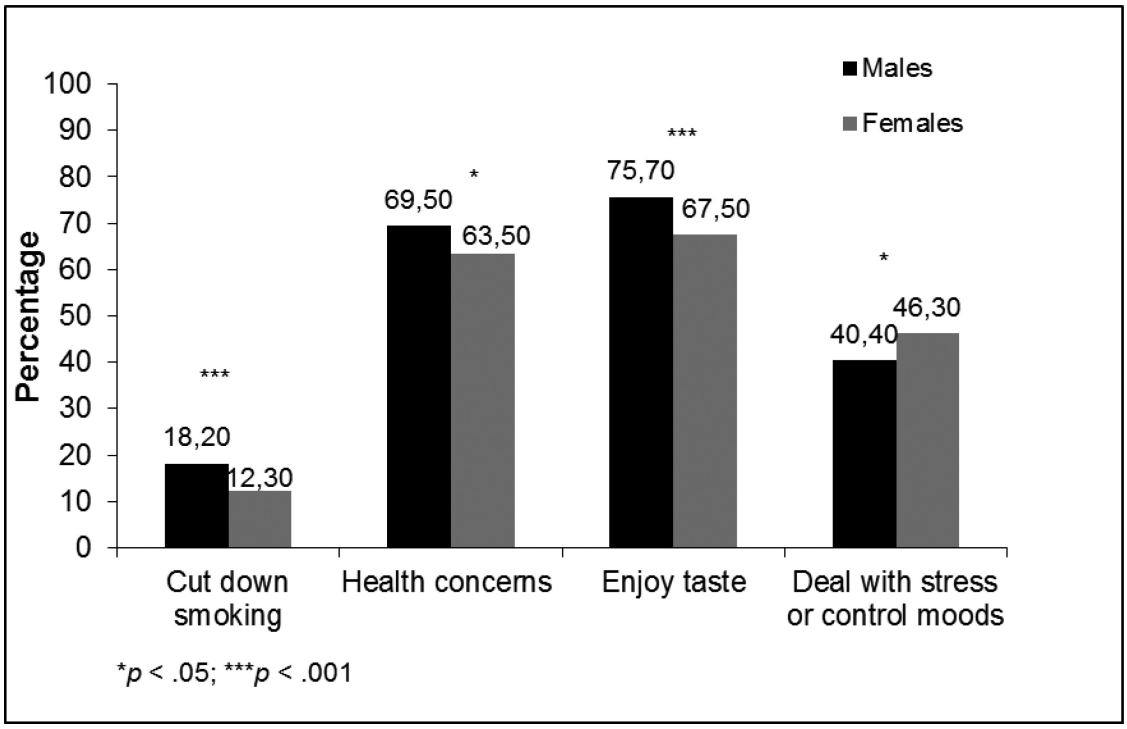

Figure 2.
Gender differences in reasons for continuing e-cigarettes use (N = 1815).

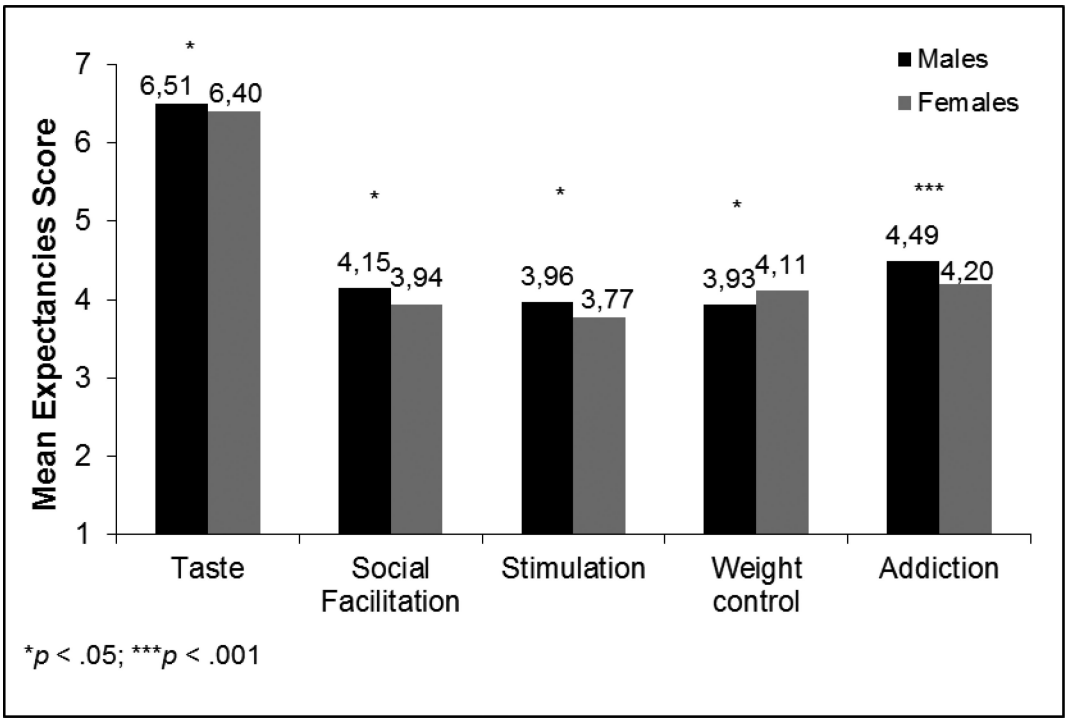

Figure 3.
Gender differences in expectancies for e-cigarettes (*N* = 1815).

Table 1

Sociodemographic and tobacco smoking characteristics in the total sample and by gender, $N = 1815$.

	Total sample 1815 (100%)	Male 1212 (66.8%)	Female 603 (33.2%)			
	n (%)	n (%)	n (%)	χ^2	*p*	Cramer's *V*
Age				187.94	.001	0.32
18-29	471 (26.0)	392 (32.3)	79 (13.1)			
30-44	681 (37.5)	506 (41.7)	175 (29.0)			
45-59	508 (28.0)	244 (20.1)	264 (43.8)			
60+	155 (8.5)	70 (5.8)	85 (14.1)			
Race				8.53	.003	0.07
White/Caucasian	1671 (92.1)	1100 (90.8)	571 (94.7)			
Other	144 (7.9)	112 (9.2)	32 (5.3)			
Marital status				90.90	.001	0.22
Never married	522 (28.8)	427 (35.2)	95 (15.8)			
Married or living together	1039 (57.2)	658 (54.3)	381 (63.2)			
Separated/divorced/widowed	254 (14.0)	127 (10.5)	127 (21.1)			
Education				3.46	.177	
HS/Less than HS/Prefer not to answer	314 (17.3)	199 (16.4)	115 (19.1)			
Some college/tech school/Bachelor's	1288 (71.0)	877 (72.4)	411 (68.2)			
> 4 years college/Professional degree	213 (11.7)	136 (11.2)	77 (12.8)			
Income				16.07	.001	0.09
Under $40,000	737 (40.6)	460 (38.0)	277 (45.9)			
$40,000-$89,999	721 (39.7)	486 (40.1)	235 (39.0)			
Over $90,000	357 (19.7)	266 (21.9)	91 (15.1)			
Age started smoking tobacco cigarettes				14.57	.001	0.09
< 16 years	811 (44.7)	504 (41.6)	307 (50.9)			
16-20 years	846 (46.6)	600 (49.5)	246 (40.8)			
> 20 years	158 (8.7)	108 (8.9)	50 (8.3)			
Tobacco cigarettes smoked per day (before cessation for former smokers)				8.04	.018	0.07
Less than 10 cigarettes	360 (19.8)	254 (21.0)	106 (17.6)			
10-20 cigarettes	630 (34.7)	435 (35.9)	195 (32.3)			
More than 20 cigarettes	825 (45.5)	523 (43.2)	302 (50.1)			
Time since last tobacco cigarette				7.81	.099	
Less than one month ago (dual users)	381 (21.0)	266 (21.9)	115 (19.1)			
1-6 months	622 (34.3)	413 (34.1)	209 (34.7)			
6-12 months	366 (20.2)	251 (20.7)	115 (19.1)			
1-5 years	425 (23.4)	265 (21.9)	160 (26.5)			
More than 5 years ago	21 (1.2)	17 (1.4)	4 (0.7)			
Smoking status				2.01	.087	
Dual user (tobacco cigarettes + e-cigarettes)	381 (21.0)	266 (21.9)	115 (19.1)			

	Total sample 1815 (100%)	**Male 1212 (66.8%)**	**Female 603 (33.2%)**			
	n (%)	**n (%)**	**n (%)**	**χ^2**	***p***	**Cramer's *V***
Only e-cigarettes user (former smoker)	1434 (79.0)	946 (78.1)	488 (80.9)			

Table 2

Patterns of e-cigarette use in the total sample and by gender, $N = 1815$.

	Total sample 1815 (100)	Male 1212 (66.8%)	Female 603 (33.2%)			
	n (%)	n (%)	n (%)	χ^2	*p*	Cramer's *V*
Time since started using e-cigarettes				7.97	.090	
Less than 1 month ago	126 (6.9)	92 (7.6)	34 (5.6)			
1-6 months ago	711 (39.2)	477 (39.4)	234 (38.8)			
6-12 months ago	410 (22.6)	281 (23.2)	129 (21.4)			
12-24 months ago	296 (16.3)	198 (16.3)	98 (16.3)			
More than 2 years ago	272 (15.0)	164 (13.5)	108 (17.9)			
Frequency of use of e-cigarettes				2.01	.330	
1-9 times a day	554 (30.5)	357 (29.5)	197 (32.7)			
10-20 times a day	730 (40.2)	499 (41.2)	231 (38.3)			
More than 20 times a day	531 (29.3)	356 (29.4)	175 (29.0)			
How often do you use e-cigarettes?				0.16	.690	
Daily	1721 (94.8)	1151 (95.0)	570 (94.5)			
Non-daily	94 (5.2)	61 (5.0)	33 (5.5)			
Type of e-cigarettes used				18.51	.001	0.01
Non-disposable	1781 (98.1)	1201 (99.1)	580 (96.2)			
Disposable	34 (1.9)	11 (0.9)	23 (3.8)			
What flavor of e-cigarette do you use the most?				6.74	.009	0.06
Non-tobacco	1503 (82.8)	984 (81.2)	519 (86.1)			
Tobacco	312 (17.2)	228 (18.8)	84 (13.9)			
Concentration or strength of nicotine in your e-cigarette				33.39	.001	0.14
0 mg	50 (2.8)	21 (1.7)	29 (4.8)			
Low: 4-8 mg	381 (21.0)	258 (21.3)	123 (20.4)			
Medium: 9-16 mg	658 (36.3)	453 (37.4)	205 (34.0)			
High: 16-24 mg	584 (32.2)	404 (33.3)	180 (29.9)			
Extra high: more than 24 mg	42 (2.3)	27 (2.2)	15 (2.5)			
Other	100 (5.5)	49 (4.1)	51 (8.5)			
Generation of e-cigarettes						
First generation	190 (10.5)	104 (8.6)	86 (14.3)	13.87	.001	0.09
Second generation	1112 (61.3)	773 (63.8)	339 (56.2)	9.70	.002	0.07
Where do you get information about e-cigarettes?						
Online	1640 (90.4)	1127 (93.0)	513 (85.1)	28.93	.001	0.13
Friends/family	551 (30.4)	330 (27.2)	221 (36.7)	16.91	.001	0.10
Tv/media advertisement	58 (3.2)	27 (2.2)	31 (5.1)	11.05	.001	0.08
Gas stations/cigarette stores	49 (2.7)	20 (1.7)	29 (4.8)	15.30	.001	0.09
Where do you buy your e-cigarette supplies?						

	Total sample 1815 (100)	**Male 1212 (66.8%)**	**Female 603 (33.2%)**			
	n (%)	**n (%)**	**n (%)**	**χ^2**	***p***	**Cramer's *V***
Online	1531 (84.4)	1074 (88.6)	457 (75.8)	50.19	.001	0.17
Gas stations/cigarette stores	105 (5.8)	50 (4.1)	55 (9.1)	18.44	.001	0.10
Read and/or participate in online forums discuss e-cigarettes? (yes)	1527 (84.1)	1074 (88.6)	453 (75.1)	54.89	.001	0.17
Use e-cigarette in places where smoking tobacco are not allowed?						
Home (yes)	1448 (79.8)	993 (81.9)	455 (75.5)	10.46	.001	0.08
Work (yes)	895 (49.3)	664 (54.8)	231 (38.3)	43.74	.001	0.16