



HHS Public Access

Author manuscript

Tob Regul Sci. Author manuscript; available in PMC 2017 November 01.

Published in final edited form as:

Tob Regul Sci. 2017 October ; 3(4): 516–524. doi:10.18001/TRS.3.4.11.

Internet-based Advertising Claims and Consumer Reasons for Using Electronic Cigarettes by Device Type in the US

Kim Pulvers, PhD, MPH,

Associate Professor, California State University San Marcos, Department of Psychology, San Marcos, CA

Jessica Y. Sun, BA,

Research Associate, University of California, San Diego, Moores Cancer Center, La Jolla, CA

Yue-Lin Zhuang, PhD,

Postdoctoral Fellow, University of California, San Diego, Moores Cancer Center, La Jolla, CA

Gabriel Holguin, BA, and

Graduate Student, California State University San Marcos, Department of Psychology, San Marcos, CA

Shu-Hong Zhu, PhD

Professor, University of California, San Diego, Department of Family Medicine and Public Health, La Jolla, CA

Abstract

Objectives—Important differences exist between closed-system and open-system e-cigarettes, but it is unknown whether online companies are marketing these devices differently and whether consumer reasons for using e-cigarettes vary by device type. This paper compares Internet-based advertising claims of closed- versus open-system products, and evaluates US consumers' reasons for using closed- versus open-system e-cigarettes.

Methods—Internet sites selling exclusively closed (N = 130) or open (N = 129) e-cigarettes in December 2013–January 2014 were coded for advertising claims. Current users (≥18 years old) of exclusively closed or open e-cigarettes (N = 860) in a nationally representative online survey in February–March 2014 provided their main reason for using e-cigarettes.

Results—Internet sites that exclusively sold closed-system e-cigarettes were more likely to make cigarette-related claims such as e-cigarettes being healthier and cheaper than cigarettes ($p < .0001$) compared to sites selling open systems. Many sites implied their products could help smokers quit. Exclusive users of both systems endorsed cessation as their top reason. Closed-system users were more likely to report their reason as “use where smoking is banned.”

Correspondence Dr Pulvers; kpulvers@csusm.edu.

Human Subjects Approval Statement

This research involved human subjects and was approved by the Institutional Review Board at the University of California, San Diego.

Conflict of Interests Statement

No authors have conflicts of interest.

Conclusions—Although promotion of e-cigarettes as cessation aids is prohibited, consumers of both systems endorsed smoking cessation as their top reason for using e-cigarettes.

Keywords

electronic nicotine delivery system; ENDS; vaping; first generation; second or third generation ENDS; marketing

Since the introduction of electronic cigarettes (e-cigarettes) onto the market in the United States (US) in 2007, devices have rapidly evolved in design. Cigalikes are first-generation devices and are also known as “closed” systems given their inability to be filled with e-liquids by the user and lack of user customizability. Newer, second- (eGo) and third-generation (mod) tank systems are considered “open,” given their ability to be filled with third-party e-liquid and/or customized/modified by the user. The number of flavors of e-liquid available has increased dramatically, driven largely by vendors of open-system devices.¹

Exposure to tobacco marketing is linked to intention to use and subsequent use,²⁻⁴ and the Internet plays a major role in e-cigarette sales.⁵⁻⁷ Important differences exist between closed-system (ie, first-generation cigalike) and open-system (ie, second- and third-generation) products, but it is unknown whether online companies are marketing these devices differently. For example, users of open-system devices are more likely to have made recent quit attempts or succeeded in quitting smoking,⁸ which may be due to better nicotine delivery or flavor variability.⁹⁻¹¹ However, a nationally representative study in 2014 showed that more US consumers of e-cigarettes used closed systems,⁸ which might be due to more aggressive advertising of closed-system products. Despite emerging knowledge of the differences between open- and closed-system e-cigarettes, a comparison in marketing trends for closed- versus open-system products sold on the Internet has not been made. Such a comparison could identify gaps in US regulatory practices and inform regulatory actions. Given that closed-system e-cigarettes are more likely to be owned by tobacco companies,¹² regulatory actions may vary systematically between vendors of closed- versus open-system products given various motives of the companies. Internet-based analyses of health behaviors including e-cigarette use provide a valuable tool for public health research and complement survey-based research.¹³⁻¹⁵

Furthermore, it is unknown whether consumer reasons for using e-cigarettes vary by product type (ie, open- vs closed-system). Leading consumer reasons for using e-cigarettes include trying to quit smoking, perceiving them as safer than cigarettes, and perceiving them as easier to use when one cannot smoke.¹⁶⁻²² Work utilizing Web data suggests a shift in consumer reasons for using e-cigarettes from cessation and indoor use toward external benefits such as social image.²³ Given important differences between open- and closed-system devices, understanding variability in consumer reasons for using these products also may inform regulation. This paper compares Internet-based advertising claims of closed- versus open-system products, and evaluates US consumers’ reasons for using closed- versus open-system e-cigarettes. The time-period under evaluation in the present study (2013–2014) represents a time when e-cigarette awareness and usage were at a peak.²⁴

Additionally, Internet-based shopping searches significantly increased from 2013 to 2014 and were projected to continue growing.¹⁵

METHODS

Data Source

Internet search—An Internet search was conducted to gather information on claims made by brands that offered either open- or closed-system e-cigarettes. Sites were identified via Internet search using the following procedure. A search was conducted using 3 engines, Google, Yahoo, and Bing from May to August 2012, and repeated from December 2013 to January 2014. Only sites that were still active in December 2013 and January 2014 were included in this analysis. Thirteen keywords were used: “e-cigarette,” “e cigarette,” “e-cig,” “e cig,” “ecig,” “ecigs,” “electronic cigarette,” “electronic cig,” “electronic nicotine delivery system,” “vape,” “vaper” and “vaping.” The first 30 pages of each search were used to provide a somewhat more comprehensive evaluation of Internet-based content, as opposed to focusing only on what consumers are most likely to see in the first page of results. Given that search engines often personalize results based on IP address, location, and recent queries, we turned off search personalization when possible (ie, Google offers search customization opt-out). A full description of the Internet search method utilized has been published previously.¹ In summary, sites had to be in English, offer a clearly branded product, list prices, and sell directly to consumers online. Wholesalers, manufacturers, auction sites such as Ebay, and retailers such as Amazon were excluded. Sites that sold *only* vaporizers for marijuana were excluded. However, if the device was dual intent (ie, advertised as for nicotine e-liquid as well as for hash oil), the site was included.

Online survey—To ascertain consumer reasons for using open- versus closed-system e-cigarettes, a nationally representative online survey was conducted by GfK’s KnowledgePanel from February to March 2014. The survey included both smokers and non-smokers. Smokers were oversampled given the high concentration of e-cigarette users among them. The present study focuses on current e-cigarette users who were exclusive users of either open- or closed-system e-cigarettes (N = 860). Those who used both systems were excluded (N = 63). Table 1 displays the sample characteristics.

Measures

Internet search—All products on each eligible site were reviewed in January to March 2014, and each site was coded for the presence of cigalikes (cigarette-shaped devices), eGos (marker-like devices), and mods (other devices). Most cigalikes were closed systems, but open-system cigalikes also exist (eg, Joye 510 or Kanger 808, 2 cigalike models available as both open and closed systems). In contrast, eGos and mods are invariably open systems. This study contrasts sites that carried only cigalikes (closed systems; N = 130) with sites that carried only eGos or mods (open systems; N = 129).

A review of the top-level domains of the 259 websites included in the final analysis of sites that carried only open (N = 129) or closed systems (N = 130) revealed that only about 8% were from foreign domains. Approximately half of these (about 4% of websites) were from

the United Kingdom (UK). It is not possible to determine how many of the .coms are foreign-based given this information was not collected at the time of analysis and many of the websites are now defunct. However, Internet-based research of e-cigarette products conducted during a similar period (2013–2014), in which domestic versus foreign domains were tracked, revealed that 86%–96% of sites were US-based.^{7,25} Additionally, at the time of search, to our knowledge, 2 e-cigarette brands sold online were owned by tobacco companies (blu and Zigzag). However, ownership of websites was not tracked during data collection.

Sites were coded for the presence of the following 6 claims:

- “Helps with quitting (directly)” – Directly stating that e-cigarettes aid in cessation.
- “Helps with quitting (indirectly)” – Implying that e-cigarettes aid in cessation, such as by means of customer testimonials, linking to an outside page, or embedding video content from an outside source.
- “Healthier or better than cigarettes” – Claims such as no carcinogens, better than cigarettes, no secondhand smoke.
- “Use where smoking is banned” – Statements such as “use in more places” or “beat the smoking ban.”
- “Cheaper than cigarettes” – Claims that e-cigarettes save money or presence of a savings calculator.
- “Cessation-related disclaimer” – Contains disclaimer specifically relating to smoking cessation, such as “Not approved as a cessation aid.” General disclaimers, such as “Nicotine is addictive,” “Not to be used by pregnant women or those under 18,” or “Not intended to affect or change the function or structure of the body” were not considered to be related to cessation.

A team of 14 research assistants were trained in the coding protocol by the project manager and reviewed the websites. The project manager performed daily quality assurance checks to ensure consistency and was always available during data collection to resolve any discrepancies or questions.

Online survey—Current e-cigarette users were defined as those who used e-cigarettes every day or some days at the time of survey. Those who used exclusively open- or exclusively closed-systems were asked to identify their main reason for using e-cigarettes. Dual users of open- and closed-systems ($N = 75$) were not included in analyses. Possible response options included: “Healthier than cigarettes,” “Cheaper than cigarettes,” “To quit smoking cigarettes,” “To use where I can’t smoke cigarettes,” “It looks good,” “It tastes good,” “To hang out with friends or family,” “To manage my weight,” and “Other.” These options were randomly presented in one of 2 sets to minimize order effects; multiple selections were not allowed.

Analyses

The percentages of reasons for using e-cigarettes were weighted by population parameters based on the most recent US Current Population Survey. A survey-specific, post-stratification adjustment was used to account for any survey non-responses, as well as any non-coverage, and oversampling resulting from the survey-specific sampling design. We used z-scores to examine the difference in the advertising claims between closed- and open-systems, and Wald chi-square tests were used to test for differences in reasons for using closed- and open-system e-cigarettes. Variance estimates were computed using SAS[®] 9.3.²⁶

RESULTS

Internet Search

Advertising claims of closed- versus open-system sites were compared. Internet sites which exclusively sold closed-system e-cigarettes ($M = 3.8$, 95% confidence interval 3.6–4.0) were significantly more likely than those, which sold only open-system products ($M = 2.1$, 95% confidence interval 1.8–2.4) to make claims about their product, averaging almost twice as many claims. Examining the pattern of specific claims, closed-system sites were significantly more likely to advertise that e-cigarettes were healthier and cheaper than cigarettes, and to state that e-cigarettes could be used where smoking is banned. As Figure 1 shows, the largest difference was in the claim that e-cigarettes could be used where smoking is banned, made by 87.7% of online vendors of closed-system products versus 31.0% of open-system products.

Online Survey

As Table 1 shows, closed-system e-cigarettes were used somewhat more frequently than open-system ones in the study sample. Use of closed- versus open-system e-cigarettes varied by several demographic characteristics. Subjects age 45 years and older, females, non-Hispanic Whites, and those with less education were more likely to use closed- than open-systems. In contrast, those who identified as non-Hispanic other race (non-white or black) were more likely to use open- than closed-system e-cigarettes.

Consumer reasons for using closed- versus open-system e-cigarettes were analyzed. As Figure 2 shows, the top 3 reasons for all e-cigarettes users were to quit smoking, because they are healthier than cigarettes and because they can be used where smoking is banned. There was no difference in the top 2 reasons between closed-system-only users and open-system-only users, whereas closed-system-only users were more likely to cite the third reason: ‘use where smoking is banned.’

DISCUSSION

In this study, we found that Internet sites that exclusively sold closed-system e-cigarettes were significantly more likely to make claims about their products than those that sold only open systems. This complements previous research finding that US consumers are more likely to use closed- than open-systems.⁸ Differences in advertising claims on Internet sites that exclusively sold closed-system versus open-system e-cigarettes were large. Several of

these differences included advertising the products as being able to be used where smoking is banned, and as healthier and cheaper than cigarettes. Closed system e-cigarettes are more likely to be owned by tobacco companies,¹² which may account for the larger number of advertising claims on Internet sites that exclusively sold closed-system versus open-system e-cigarettes.²⁷ It is noteworthy that the largest difference in claims between online retailers of open- and closed-system products was in using e-cigarettes where smoking is banned. Using nicotine-containing e-cigarettes where smoking is banned is a common practice,²⁸ and one that may support dual use of tobacco and sustained tobacco dependence.²⁹

The top reason for using e-cigarettes by consumers of both open- and closed-system products was to quit smoking. This is consistent with previous research showing that e-cigarette use is largely concentrated among current or former smokers.^{30,31} In addition, trying to quit smoking is one of the most common specific reasons cited by e-cigarette users in previous studies.^{16,17,22} It is important that the efficacy of e-cigarettes for smoking cessation continue to be studied, and that this research takes product type into account. Vendors of closed- and open-systems were equally likely to make claims about smoking cessation, and the majority of such claims were made indirectly given that e-cigarette claims about smoking cessation are not permissible under US Food and Drug Administration (FDA) regulations. It is noteworthy that the leading consumer reason for e-cigarette use across device types was smoking cessation, despite the prohibition of advertising smoking cessation benefits. This suggests that there are implicit advertising messages or other sources of influence driving consumer reasons for e-cigarette use.

Perceived health benefits compared to cigarettes was the second leading reason for using e-cigarettes by consumers of both open- and closed-system products, a perception that may promote use among current smokers.³² Although there is some evidence that dual use is associated with decreased harm,³³ there is concern that nicotine addiction will be sustained or increased.³⁴ Similarly, some strongly believe that e-cigarette use is beneficial for harm reduction, smoking cessation, and/or decreased population-level cigarette use,³⁵ whereas others oppose this view.^{36–39} The estimation of e-cigarettes as less harmful than cigarettes³⁵ is linked with greater e-cigarette use.^{2,40} It also has been demonstrated that exposure to advertisements containing information about e-cigarettes' lower risk compared to cigarettes is associated with greater intention to use, a concerning issue for uptake among non-tobacco users.⁴¹ However, evidence to date suggests that most e-cigarette users are current or former smokers,^{30,31} which may alleviate concern about risks of uptake among non-tobacco users exposed to information that e-cigarettes are less harmful than cigarettes.

Whereas the top 2 reasons for using e-cigarettes were identical across both product types (to quit smoking and perception as healthier), there was variability in the third reason. Users of closed-systems cited using where smoking is banned as their third most common main reason for using e-cigs. In contrast, the third most common main reason for using e-cigarettes endorsed by users of open-systems was because they taste good. Previous literature has established that newer brands, which tend to be open-system, are more likely to offer many different flavors.¹

Our findings must be viewed in light of limitations, including the use of different assessment methods for advertising claims and consumer reasons for using e-cigarettes. Whereas multiple advertising claims were coded for each website, consumers identified a single, main reason for using e-cigarettes. Therefore, it was not possible to compare data on advertising claims directly with consumer reasons for using e-cigarettes. Due to limited resources and the large number of Inter-net sites, we did not measure inter-coder reliability. However, a project manager provided close coding oversight and discrepancies were resolved. Additionally, it was not possible to establish a link between exposure to online advertising and reasons for using e-cigarettes.

Survey methods for assessing reasons for using are inherently limited given pre-determined categories which, although guided by literature, do not necessarily reflect current trends that may be better captured through real-time media analyses.^{13,15} The list of reasons on the survey was not exhaustive and did not include questions about why users chose one product over the other, nicotine concentration, or the ability to customize flavor. Regulatory-related reasons for using e-cigarettes were addressed implicitly rather than explicitly. For example, “flavors” were implicitly involved in “tastes good” and taxes are subsumed in “cheaper.”

Although the 2013–2014 time-period under evaluation was important given peak e-cigarette awareness, use, and Internet searching,^{15,30} and our study provides a snapshot of this critical time, it must be noted that this is a rapidly changing area. Other media-based work suggests that leading consumer reasons for using e-cigarettes has shifted from health and cessation reasons.^{15,23} It is possible that the decline in current e-cigarette Internet searches and Tweets pertaining to health and cessation reflect the accumulation of a critical mass of information about these topics, and a shift to consumer actions to acquire the product and reflect on other benefits.

Conclusions

Websites selling exclusively closed-system e-cigarettes were more likely to reference cigarettes in their advertising claims, including being healthier, cheaper, and useful where smoking is banned. Despite the prohibition of advertising smoking cessation benefits, approximately half the websites made indirect claims about smoking cessation. Consumers of both closed and open systems endorsed smoking cessation as their top reason for using-e-cigarettes. Given differences in efficacy for smoking cessation between product types,^{8,9} an FDA ban of open systems called for by tobacco companies^{42–44} could leave consumers attempting to use e-cigarettes for smoking cessation with a product that may not work well for this purpose.

Implications for Tobacco Regulation

Consumers of both closed- and open-system products are getting the message that e-cigarettes may be useful for cessation, despite current FDA advertising regulation. Investigation of sources of consumer influence is needed, and we recommend that future research evaluate implicit messaging in advertising to inform additional regulatory action on marketing. Actionable regulatory measures include working with search providers to deliver counter-messaging, or imposing fines to vendors who violate regulations.⁴⁵ Although much

Internet browsing is guided by location, which would mean that US consumers are more likely to view domestic websites, an international online marketplace poses a challenge for FDA regulatory authority.

Acknowledgments

The National Cancer Institute of the National Institutes of Health under the State and Community Tobacco Control Initiative, Award Number U01CA154280, supported this study. The study sponsor had no role in the study design, collection, analysis, or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication. We thank anonymous reviewers for comments on the paper.

References

1. Zhu SH, Sun JY, Bonnevie E, et al. Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. *Tob Control*. 2014; 23(Suppl 3):iii3–iii9. [PubMed: 24935895]
2. Pokhrel P, Fagan P, Kehl L, Herzog TA. Receptivity to e-cigarette marketing, harm perceptions, and e-cigarette use. *Am J Health Behav*. 2015; 39(1):121–131. [PubMed: 25290604]
3. Capella M, Webster C, Kinard B. A review of the effect of cigarette advertising. *Internat J Research Mark*. 2011; 28:269–279.
4. National Cancer Institute. *The Role of Media in Promoting and Reducing Tobacco Use*. Bethesda, MD: US Department of Health and Human Services. National Institutes of Health; 2008. Tobacco Monograph. No. 19
5. Noel JK, Rees VW, Connolly GN. Electronic cigarettes: a new ‘tobacco’ industry? *Tob Control*. 2011; 20(1):81. [PubMed: 20930060]
6. Yamin CK, Bitton A, Bates DW. E-cigarettes: a rapidly growing Internet phenomenon. *Ann Intern Med*. 2010; 153(9):607–609. [PubMed: 21041581]
7. Mackey TK, Miner A, Cuomo RE. Exploring the e-cigarette e-commerce marketplace: Identifying Internet e-cigarette marketing characteristics and regulatory gaps. *Drug Alcohol Depend*. 2015; 156:97–103. [PubMed: 26431794]
8. Chen C, Zhuang YL, Zhu SH. E-cigarette design preference and smoking cessation: a U.S. population study. *Am J Prev Med*. 2016; 51(3):356–363. [PubMed: 27005984]
9. Tackett AP, Lechner WV, Meier E, et al. Biochemically verified smoking cessation and vaping beliefs among vape store customers. *Addiction*. 2015; 110(5):868–874. [PubMed: 25675943]
10. Etter JF. Explaining the effects of electronic cigarettes on craving for tobacco in recent quitters. *Drug Alcohol Depend*. 2015; 148:102–108. [PubMed: 25592454]
11. Farsalinos KE, Romagna G, Tsiapras D, et al. Impact of flavour variability on electronic cigarette use experience: an internet survey. *Int J Environ Res Public Health*. 2013; 10(12):7272–7282. [PubMed: 24351746]
12. Hitchman SC, Brose LS, Brown J, et al. Associations between e-cigarette type, frequency of use, and quitting smoking: findings from a longitudinal online panel survey in Great Britain. *Nicotine Tob Res*. 2015; 17(10):1187–1194. [PubMed: 25896067]
13. Ayers JW, Althouse BM, Dredze M. Could behavioral medicine lead the web data revolution? *JAMA*. 2014; 311(14):1399–1400. [PubMed: 24577162]
14. Ayers JW, Ribisl KM, Brownstein JS. Tracking the rise in popularity of electronic nicotine delivery systems (electronic cigarettes) using search query surveillance. *Am J Prev Med*. 2011; 40(4):448–453. [PubMed: 21406279]
15. Ayers JW, Althouse BM, Allem JP, et al. Revisiting the rise of electronic nicotine delivery systems using search query surveillance. *Am J Prev Med*. 2016; 50(6):e173–e181. [PubMed: 26876772]
16. Zhu SH, Gamst A, Lee M, et al. The use and perception of electronic cigarettes and snus among the U.S. population. *PLoS One*. 2013; 8(10):e79332. [PubMed: 24250756]
17. Etter J, Bullen C. Electronic cigarette: users profile, utilization, satisfaction and perceived efficacy. *Addiction*. 2011; 106:2017–2028. [PubMed: 21592253]

18. Dockrell M, Morrison R, Bauld L, McNeill A. E-cigarettes: prevalence and attitudes in Great Britain. *Nicotine Tob Res.* 2013; 15(10):1737–1744. [PubMed: 23703732]
19. Kong G, Morean ME, Cavallo DA, et al. Reasons for electronic cigarette experimentation and discontinuation among adolescents and young adults. *Nicotine Tob Res.* 2015; 17(7):847–854. [PubMed: 25481917]
20. Pacek LR, Johnson PS, Johnson MW, et al. Cigarette users' interest in using or switching to electronic nicotine delivery systems for smokeless tobacco for harm reduction, cessation, or novelty: a cross-sectional survey of US adults. *Experiment Clinic Psychopharm.* 2015; 17(2):245–255.
21. Rass O, Pacek L, Johnson P, Johnson M. Characterizing use patterns and perceptions of relative harm in dual users of electronic and tobacco cigarettes. *Experiment Clinic Psychopharm.* 2015; 23(6):494–503.
22. Ruten LJ, Blake KD, Agunwamba AA, et al. Use of e-cigarettes among current smokers: associations among reasons for use, quit intentions, and current tobacco use. *Nicotine Tob Res.* 2015; 17(10):1228–1234. [PubMed: 25589678]
23. Ayers JW, Leas EC, Allem JP, et al. Why do people use electronic nicotine delivery systems (electronic cigarettes)? A content analysis of Twitter, 2012–2015. *PLoS One.* 2017; 12(3):e0170702. [PubMed: 28248987]
24. King B, Patel R, Nguyen K, Dube SR. Trends in awareness and use of electronic cigarettes among US adults, 2010–2013. *Nicotine Tob Res.* 2014; 17(2):219–227. [PubMed: 25239961]
25. Cuomo RE, Miner A, Mackey TK. Pricing and sales tax collection policies for e-cigarette starter kits and disposable products sold online. *Drug Alcohol Rev.* 2015; 35(Special Section: Alcohol Policy):110–114.
26. SAS Institute Inc. *Base SAS® 9.3 Procedures Guide.* Cary, NC: SAS Institute Inc; 2011.
27. de Andrade, M., Hastings, G., Angus, K., et al. *A Report Commissioned by Cancer Research UK.* London, UK: Cancer Research UK; 2013. *The Marketing of Electronic Cigarettes in the UK.*
28. Shi Y, Cummins SE, Zhu SH. Use of electronic cigarettes in smoke-free environments. *Tob Control.* 2017; 26(e1):e19–e22. [PubMed: 27609779]
29. Henningfield JE, Zaatari GS. Electronic nicotine delivery systems: emerging science foundation for policy. *Tob Control.* 2010; 19(2):89–90. [PubMed: 20378582]
30. King BA, Alam S, Promoff G, et al. Awareness and ever-use of electronic cigarettes among U.S. adults, 2010–2011. *Nicotine Tob Res.* 2013; 15(9):1623–1627. [PubMed: 23449421]
31. Regan AK, Promoff G, Dube SR, Arrazola R. Electronic nicotine delivery systems: adult use and awareness of the 'e-cigarette' in the USA. *Tob Control.* 2013; 22(1):19–23. [PubMed: 22034071]
32. Carpenter CM, Connolly GN, Ayo-Yusuf OA, Wayne GF. Developing smokeless tobacco products for smokers: an examination of tobacco industry documents. *Tob Control.* 2009; 18(1):54–59. [PubMed: 18948390]
33. Farsalinos KE, Polosa R. Safety evaluation and risk assessment of electronic cigarettes as tobacco cigarette substitutes: a systematic review. *Ther Adv Drug Saf.* 2014; 5(2):67–86. [PubMed: 25083263]
34. Pulvers K, Hayes RB, Scheuermann TS, et al. Tobacco use, quitting behavior, and health characteristics among current electronic cigarette users in a national tri-ethnic adult stable smoker sample. *Nicotine Tob Res.* 2015; 17(9):1085–1095. [PubMed: 25385875]
35. Nutt DJ, Phillips LD, Balfour D, et al. Estimating the harms of nicotine-containing products using the MCDA approach. *Eur Addict Res.* 2014; 20(5):218–225. [PubMed: 24714502]
36. Green SH, Bayer R, Fairchild AL. Evidence, policy, and e-cigarettes – will England reframe the debate? *N Engl J Med.* 2016; 374(14):1301–1303. [PubMed: 27050203]
37. Lancet. E-cigarettes: Public Health England's evidence-based confusion. *Lancet.* 2015; 386(9996):829. [PubMed: 26335861]
38. McKee M, Capewell S. Electronic cigarettes: we need evidence, not opinions. *Lancet.* 2015; 386(10000):1239.
39. Grana R, Benowitz N, Glantz SA. E-cigarettes: a scientific review. *Circulation.* 2014; 129(19):1972–1986. [PubMed: 24821826]

40. Choi K, Forster J. Characteristics associated with awareness, perceptions, and use of electronic nicotine delivery systems among young US midwestern adults. *Am J Pub Health*. 2013; 103:556–561. [PubMed: 23327246]
41. Trumbo CW, Kim SJ. The effect of electronic cigarette advertising on intended use among college students. *Addict Behav*. 2015; 46:77–81. [PubMed: 25827334]
42. Neal, M. [Accessed June 12, 2016] The maker of Vuse e-cigs is lobbying to ban vaping (updated). 2014. Available at: <http://gizmodo.com/the-maker-of-blu-e-cigs-is-lobbying-to-ban-vaping-1633442788>
43. Haar, M. [Accessed June 12, 2016] Reynolds calls for open system ban. 2014. Available at: <http://www.cspdailynews.com/category-news/tobacco/articles/reynolds-calls-open-system-ban>
44. Geller, M. [Accessed June 12, 2016] When it comes to e-cigs, Big Tobacco is concerned for your health. 2015. Available at: <http://www.reuters.com/article/us-ecigarettes-regulations-specialreport-idUSKBN0MJ0GN20150323>
45. Allem JP, Ayers JW, Althouse BM, Williams R. When a ban really is not a ban: internet loopholes and Djarum flavoured cigarettes in the USA. *Tob Control*. 2016; 25(4):489–490. [PubMed: 26085123]

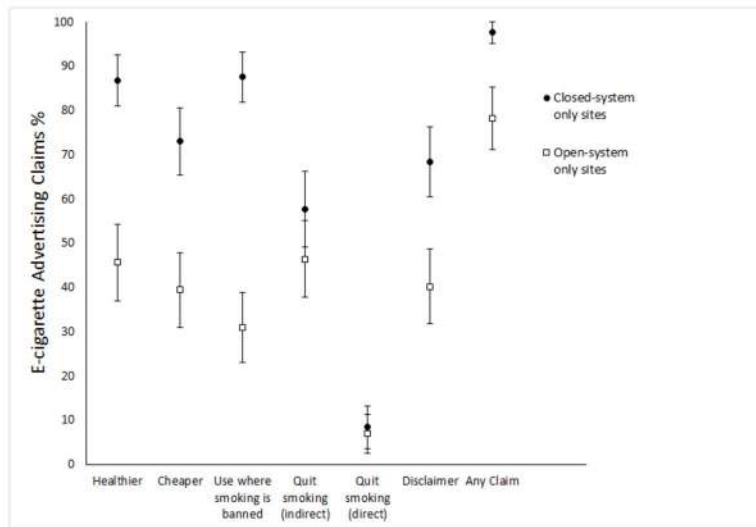


Figure 1.
Advertising Claims of Closed-system versus Open-system Sites

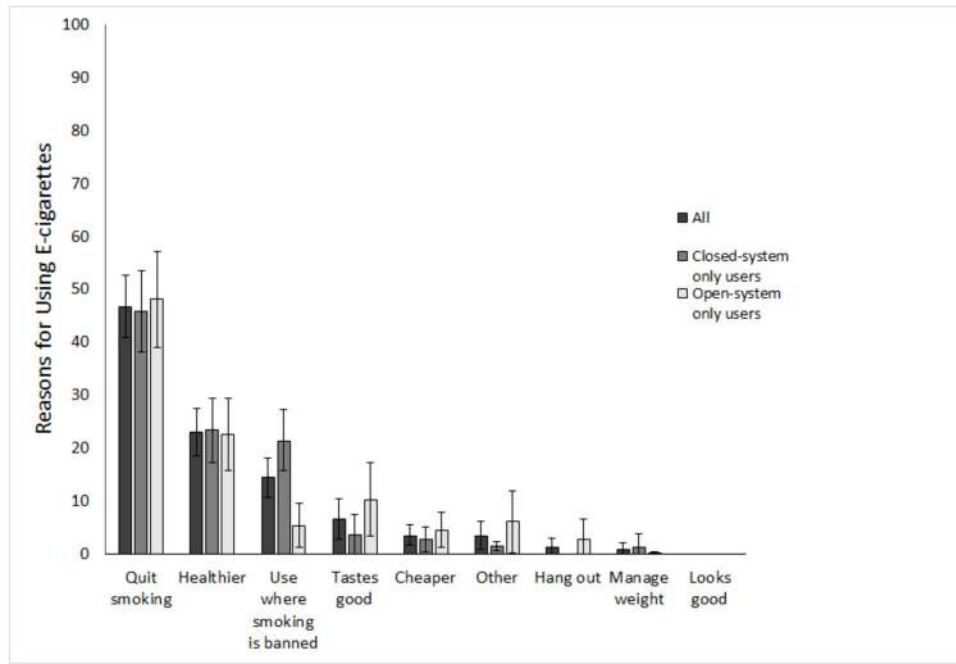


Figure 2. Consumer Reasons for Using Closed-system versus Open-system E-cigarettes

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Sample Characteristics

	All	Closed-system only users (N = 556) % (95% CI)	Open-system only users (N = 304) % (95% CI)
Total	860	56.6 (50.8, 62.4)	43.4 (37.6, 49.2)
Sex			
Male	296	51.2 (42.4, 60.1)	48.8 (40.0, 57.6)
Female	564	61.2 (53.8, 68.6)	38.8 (31.4, 46.2)
Age			
18–24	36	59.1 (34.7, 83.6)	40.9 (16.4, 65.3)
25–44	258	44.6 (35.7, 53.6)	55.4 (46.4, 64.3)
45–64	444	66.8 (59.8, 73.8)	33.2 (26.2, 40.2)
65+	122	71.4 (59.6, 83.2)	28.6 (16.8, 40.4)
Education			
≤High School	240	59.6 (51.3, 68.0)	40.4 (32.0, 48.7)
>High School	620	53.3 (45.3, 61.4)	46.7 (38.6, 54.7)
Ethnicity			
Non-Hispanic White	708	62.3 (56.1, 68.5)	37.7 (31.5, 43.9)
Non-Hispanic Black	40	47.3 (21.7, 72.8)	52.7 (27.2, 78.3)
Hispanic	50	42.0 (24.4, 59.7)	58.0 (40.3, 75.6)
Non-Hispanic Other	62	31.7 (14.5, 48.9)	68.3 (51.1, 85.5)