Brief report

How US Smokers Refer to E-cigarettes: An Examination of User-Generated Posts From a Web-Based Smoking Cessation Intervention, 2008–2015

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Abstract

Introduction: A challenge in Electronic Nicotine Delivery System (ENDS) research is how to refer to these devices in ways that are meaningful to current or potential users. The objectives of this study were to: (1) describe the frequency of ENDS terms in a web-based smoking cessation intervention; and (2) determine whether terms vary by US geographic region and date.

Methods: Data were drawn from public posts between 2008–2015 on <http://BecomeAnEX.org> and limited to US users. We conducted “exact” and “fuzzy” searches to find posts containing ENDS keywords using custom Python scripts, and extracted geocoding data and date for each post. We examined counts and frequencies of ENDS terms by unique user, by unique user and region, and by unique user and date.

Results: We identified 1023 unique US website users who had written a post containing one or more ENDS keywords. Posters were majority female (79%), educated (78% attended at least some college), and had a median age of 47 years. Overall, 92% of ENDS posters employed the term “e-cigarette” or a derivation. Derivations of “vape” became increasingly popular in 2013, whereas “NJoy” and “blu” were employed by fewer than 2% of posters. We found no variation in frequency of ENDS terms by US region.

Conclusions: Researchers may have confidence that “e-cigarette” and “vape” are recognizable terms among US treatment-seeking smokers. Conversely, terms such as “ENDS,” commonly employed by researchers and public health advocates, are not used by smokers and may be an impediment to tobacco control research.

Implications: Researchers may have confidence that “e-cigarette,” and, to a lesser extent, “vape” are recognizable terms among US adult smokers referring to ENDS (including accessories, brand names, and actions). Conversely, terms such as “electronic nicotine delivery systems,” commonly employed by researchers and public health advocates, are not used by US smokers and may be an impediment to tobacco control research and practice.

Introduction

The use of Electronic Nicotine Delivery Systems (ENDS; a broad term for battery-powered devices that deliver aerosolized nicotine, commonly known as “e-cigarettes”) has increased markedly in the United States since their introduction in 2007.¹ Consequently, public health and tobacco control researchers have been searching for valid and reliable measures of ENDS use, even as the products become more varied and prevalent.^{2,3} A fundamental challenge is how to refer to these devices in survey research so that terms are understandable, align with “real world” vernacular, and accurately capture the diversity of products contained in this class. While the research community often employs “Electronic Nicotine Delivery Systems” or “Alternative Nicotine Delivery Systems” as catch-all terms, the public uses terms such as “e-cigarette,” “vape pen,” “e-hookah,” or “personal vaporizer.” Some surveys address the uncertainty about ENDS terms by including all possible terms in the response query, a strategy that increases survey burden.⁴ The salience of these device names may vary by reason for use, location, policy environment, age, prior experience with ENDS, or other characteristics of subpopulations of interest to researchers. Indeed, recent research in the United States using Google Trends suggests that ENDS terms vary by location, with derivations of “vape” more common in coastal regions than in the rest of the United States.⁵ The variety of terms for the diverse ENDS product class has motivated discussion of a need for measures development,^{6–8} but there is little published methods development work.

User-generated online content is a useful source of data for identifying salient, naturalistic terms used by smokers to describe ENDS devices and behaviors. Previously, online forums have been used to research the positive and negative health effects of ENDS use⁹ and to observe trends in ENDS attitudes and behaviors.¹⁰ The purpose of this study was to identify terms US treatment-seeking smokers employ to discuss ENDS (including accessories, brand names, and actions) in natural communication by extracting all public user-generated ENDS posts from a popular online smoking cessation community between 2008 and 2015. A secondary aim was to examine variation in ENDS term use by US census region and time. Our findings inform the creation of ENDS survey items that employ user-generated terms to improve communication with adult smokers in the United States and to most effectively measure ENDS use as a cessation aid among US adult smokers.

Methods

Research Design and Setting

This study is a descriptive content analysis of public data available on BecomeAnEX, a free, web-based smoking cessation intervention primarily serving adult smokers living in the United States, developed and managed by Truth Initiative (formerly American Legacy Foundation). Launched in 2008, BecomeAnEX was developed in accordance with the US Public Health Service Clinical Practice Guidelines for Treating Tobacco Dependence. In addition to a number of static and interactive tools to prepare and aid smokers in cessation, a distinguishing feature of BecomeAnEX is its large online community of current and former smokers. Within the community, there are multiple communication channels: private messages, public posts on member profile pages (“wall”), group discussion posts/replies, and blog posts/replies. All posts made in the BecomeAnEX community are publicly visible with the exception of one-on-one messages exchanged via private message function.

Publicly available community content can be browsed anonymously, but community users must register on the site and agree to the Terms of Use and Privacy Policy to post to the site. The Terms of Use and Privacy policy states that: (1) Truth Initiative collects information about its users and their use of the site; (2) Information is used for research and quality improvement purposes only; and (3) Personal identifying information is kept confidential. Further, the EX Community Guidelines (<http://goo.gl/zYS9gz>) remind users that any information posted on public message boards is publically available and should not be considered confidential. Between its launch in 2008 and May 31, 2015, a total of 690 892 users registered on the site.

Data Collection and Analyses

The analyses employed three sources of data: (1) public communications (eg, blog posts/replies, group discussion posts/replies, wall posts) in the BecomeAnEX community that occurred between 2008–2015; (2) timestamp information of each post; and (3) demographic, smoking, and geographic data obtained during website registration. Data on ENDS use were not collected during registration. All data used in this analysis were de-identified by converting users’ IDs into meaningless yet unique combination of letters, numbers, and symbols for use during this study exclusively. This unique ID was then used to link users’ public communications and demographic information obtained during website registration.

Data collection consisted of two steps. The first step was to retrieve public posts related to ENDS from the online community. Drawing upon ENDS device terms employed in Wave 1 of the Population Assessment of Tobacco and Health Survey (see <http://goo.gl/l5tN2x> for the Population Assessment of Tobacco and Health Adult Interview), a list of popular ENDS brands from 2011 to 2013,¹¹ and nationally distributed brands from major tobacco companies and e-cigarette companies, we developed a list of ENDS keywords for data extraction. This list was iteratively refined to exclude posts that did not refer to ENDS (eg, posts with “vapor” that mentioned “Vics Vapor Rub” or “blu” that referred to blu-ray discs) and remove duplicate posts. We conducted both “exact” and “fuzzy” searches to find posts containing ENDS keywords using Python scripts. The exact matching examined each piece of text and decided whether at least one keyword among those listed in Table 1 was used. By contrast, fuzzy matching went beyond keywords in their original forms, and checked different variations of the stem term. For example, “e-cig*”, where “*” can be any character(s), will match “e-cig” and “e-cigarette”, while “vapour*” also matches “vapours.” To eliminate duplicates, keywords in their original forms were excluded from matching a second time with their variations. For instance, “e-cigar” as an original keyword did not match the variation term “e-cig*” again.

The second step in data collection was to extract geographic locations for those BecomeAnEX users who published ENDS-related content. We first checked the zip code associated with the user’s BecomeAnEX registration data and used Python package `zipcode12` to retrieve corresponding city and state associated with each zip code. For users who did not provide zip code in their profile, we extracted the IP address stored at the time of website registration and used Python package `geoip2`¹³ to identify corresponding city and state. Among all 690 892 users who registered on BecomeAnEX between February 28, 2008 and May 31, 2015, zip code and IP address information were available for 659 629 and 205 984 individuals, respectively. Users’ locations were then collapsed into regions using US

census regions (Northeast, Midwest, South, West).¹⁴ Analyses examined: (1) counts and frequencies of ENDS terms by unique user; (2) frequencies of ENDS terms by unique user and region; and (3) frequencies of ENDS terms by unique user and date.

Results

Out of a total of 26 084 BecomeAnEX users who wrote at least one public post between 2008 and 2015, we identified 1239 unique users (4.8%) who had written a total of 4308 posts containing one or more ENDS keywords, and obtained location information for 1049 (85%) of those users. An additional 26 individuals from locations outside the United States were excluded (2.5%), leaving a final sample of 1023 US-based BecomeAnEX users who employed one or more ENDS terms in at least one public post. ENDS posters were primarily female (79%), with mean age of 47 years old ($SD = 12$ years). Approximately half (51%) of ENDS posters attended some college or technical school and an additional 27% were college graduates.

Overall, 92.1% of BecomeAnEX users that posted about ENDS employed the term “e-cigarette” or a derivation of this term at least once (ie, “e-cig” or “ecig”). Derivations of “vape” (ie, “vapour,” or “vapor”) were the second most common term (23.2% of posters). Remaining terms over 1% prevalence included the brand name

“blu” (3.3%), “e-liquid” (1.9%), and “vaporizer” (1.6%). One percent or fewer of BecomeAnEX posters discussing ENDS used any of the other terms (Table 1).

Figure 1 shows the change in number terms among unique users discussing ENDS by month between March 2008 and May 2015. With few exceptions, the majority of the posts discussing ENDS each month employed a derivation of “e-cigarette.” Derivations of “vape” became increasingly popular among users discussing ENDS between 2013–2015. Use of brand names were rare in this sample. We found no statistically significant variation in frequency of ENDS terms by US census region, with region sample sizes ranging from 190 in the Northeast to 324 in the South. Derivations of “e-cigarette” were the most common terms across all regions.

Discussion

Between 2008–2015, US BecomeAnEX users employed “e-cigarette” to refer to ENDS, nearly to the exclusion of all other terms. Similar to recent research of Google search terms in the United States,⁵ we found that derivations of “vape” increased in popularity between 2013–2015, suggesting that this is also an emerging native term for ENDS among US adult current and former smokers. BecomeAnEX users seldom employed ENDS brand names or researcher-generated

Table 1. Distribution of ENDS Terms Among US Smokers Using At Least One ENDS Keyword on <http://BecomeAnEx.org> ($N = 1023$), 2008–2015

		Number of smokers who used the term	Percentage of smokers who used the term
1	e-cig ^a	942	92.1%
2	vape ^a	237	23.2%
3	blu ^a	34	3.3%
4	e-liquid ^a	19	1.9%
5	vaporizer	16	1.6%
6	e-juice ^a	10	1.0%
7	liquid nicotine	9	0.9%
8	NJOY	8	0.8%
9	vape pen	5	0.5%
10	e-pipe ^a	4	0.4%
11	hookah pen	3	0.3%
12	MarkTen [*]	2	0.2%
13	Vuse [*]	2	0.2%
14	e-nicotine ^a	1	0.1%
15	e-cigar ^a	1	0.1%
16	cigalike ^a	0	0.0%
17	e-hookah ^a	0	0.0%
18	e-sisha ^a	0	0.0%
19	e-vape ^a	0	0.0%
20	electronic nicotine delivery syste [*]	0	0.0%

Electronic Nicotine Delivery System (ENDS).

^{*}Represents fuzzy matching “wildcard.”

^aCategory combines multiple keywords, as specified below:

ecig: e-cig*, e cig*, ecig*, electronic cig*

vape: vape*, vapour*, vapor*

blu: blu, blucig, blu cig*

e-liquid: e-liquid*, eliquid*, e liquid*

e-juice: e-juice*, ejuice*, e juice*

e-pipe: e-pipe*, epipe*, e pipe*

e-nicotine: e-nicotine*, enicotine*, e nicotine*, electronic nicotine

e-cigar: e-cigar, ecigar, e cigar

cigalike: cig-alike*, cig-a-like*, cigalike*

e-hookah: e-hookah*, ehookah*, e hookah*

e-sisha: e-sisha*, esisha*, e sisha*

e-vape: e-vape*, evape*, e vape*

Figure 1. Number of unique users discussing Electronic Nicotine Delivery System (ENDS) employing the exact or fuzzy matches for the terms “e-cig*,” “vape*,” “blu,” “e-liquid*,” and “NJoy.”

terms such as “electronic nicotine device.” These nonnative terms should not be used in isolation in public-facing documents such as surveys, press releases, policy statements, or public health campaigns.^{15–24}

Limitations

The majority of BecomeAnEX users in this sample were adult current and former smokers that had registered on a quit smoking website; thus, our results may not generalize to established ENDS users, or to young adult or adolescent smokers or ENDS users. It is possible that established ENDS users, youth, young adults, or non-smokers use different terms for these devices. Additionally, our sample was primarily female, daily smokers, and had attended at least some college. While demographic characteristics of ENDS posters were similar to participants in a randomized trial recruited from the same website and to a nationally representative sample of motivated smokers who searched for health information online,²⁵ this sample may not be generalizable to all US smokers, especially light smokers or those with less education or experience with the Internet.^{26,27}

Conclusion

This is the first study of user-generated content to describe the use of ENDS terms among a large sample of treatment-seeking adult smokers. This work suggests that researchers may have confidence that “e-cigarette,” and, to a lesser extent, “vape” are salient terms among adult smokers seeking to quit smoking. Conversely, this research shows that researchers and public health advocates communicating with adult treatment-seeking smokers should refrain from employing nonnative terms for this group such as “e-hookah,” or the researcher-generated “electronic nicotine delivery systems.” These findings can be used to guide the creation of survey items to best measure ENDS use among adult smokers, the most prevalent ENDS users.³

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Declaration of Interests

None declared.

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