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Electronic Cigarettes on Twitter – Spreading the Appeal of Flavors

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Abstract

Objectives—Social media platforms are used by tobacco companies to promote products. This study examines message content on Twitter from e-cigarette brands and determines if messages about flavors are more likely than non-flavor messages to be passed along to other viewers.

Methods—We examined Twitter data from 2 e-cigarette brands and identified messages that contained terms related to e-cigarette flavors.

Results—Flavor-related posts were retweeted at a significantly higher rate by e-cigarette brands ($p = .04$) and other Twitter users ($p < .01$) than non-flavor posts.

Conclusions—E-cigarette brands and other Twitter users pay attention to flavor-related posts and retweet them often. These findings suggest flavors continue to be an attractive characteristic and their marketing should be monitored closely.

Keywords

E-cigarette; flavor; Twitter; marketing

Electronic cigarettes (e-cigarettes) deliver nicotine by turning it into an aerosol that is inhaled by the user.¹ In addition to nicotine, e-cigarettes also contain other potentially hazardous chemicals including certain flavorings.^{2–4} Although the FDA has banned flavorings (except menthol) in combustible cigarettes because of concerns that they could encourage children to smoke,^{5,6} flavorings in e-cigarettes have not been banned. E-cigarettes are currently available in hundreds of flavors including candy flavors, fruity flavors, dessert flavors, and many others.

Flavored e-cigarettes may pose a hazard to public health if the flavors, reminiscent of candy and desserts, lead young nonsmokers to experiment with nicotine products and become dependent.^{5–7} This risk is of particular concern, as a 2014 study showed that the number of never-smoking youth who used e-cigarettes in the United States increased 3-fold between 2011 and 2013 and these users had increased intentions to smoke traditional cigarettes.⁸ The risk is not limited to the United States, as countries around the world have seen an increase

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Conflict of Interest Statement

The authors have no competing interests with regards to this study.

in e-cigarette use among teens. For example, in Korea, 9.4% of teens reported ever use in 2011, up from 0.5% in 2008.⁹ In Poland, 23.5% of teens aged 15-19 reported ever use.¹⁰ Flavors such as menthol also can mask throat irritation and lead to deeper and longer inhalation of the nicotine;¹¹ moreover, chemicals in the flavorings themselves, when inhaled, may irritate the lungs.^{2,3} Flavored e-cigarettes also might have a beneficial effect if they encourage adult cigarette smokers to switch to a less harmful product, but more research will be needed to determine whether flavors cause product-switching and whether product-switching has long-term health benefits. We need to learn more about the promotional methods, appeal and impact of flavors in e-cigarettes.

Twitter

Twitter has popularized micro-blogging, allowing users to broadcast short messages (tweets) to large audiences. Other Twitter users can view these tweets and pass them along (retweet) to their own followers. Retweeting messages in networks of “friends of friends” makes it possible for any tweet to reach more people than the original author's immediate network and to cross over to new networks. Some studies^{15,16} outline the properties of retweet networks and demonstrate their diffusion potential. Another line of research is to examine networks of followers and retweets to identify influential users in the Twitter social network.^{16–20} Twitter is also growing rapidly among teens; In the US, Twitter use among online teens ages 12-17 has grown significantly, from 16% in 2011 to 24% in 2012.²¹ Analysis of the diffusion of specific tweets through the network may identify the role of tweets and retweets as a tool used for strategic marketing by e-cigarette brands.²²

Some studies of e-cigarettes have examined awareness of the product,²³ its effectiveness in relapse prevention among former smokers,²⁴ and other topics. Few studies have examined e-cigarette marketing within social media. Huang et al²⁶ captured tweets related to e-cigarettes and classified 90% of them as commercial based on user profile data, concluding that Twitter served as an important platform for e-cigarette marketing. In view of the popularity of social media platforms, the adoption of these platforms by e-cigarette brands and users, and the potential risk of e-cigarette flavors, there is a need to study the types of content used to discuss e-cigarettes and dissemination of messages related to flavors.

This study investigated whether e-cigarette brands craft their marketing messages on Twitter to promote flavors, and whether messages that promote flavors are more likely to be shared than messages without flavors. We focus on retweeting because that action is used to spread messages more widely and rapidly than the original tweet.¹⁹ We analyzed tweets originating from 2 e-cigarette brands and compared the retweet rates of messages that mention flavors (either by individuals or by e-cigarette brands) and messages that do not.

METHODS

We collected 6 months of tweets from 2 e-cigarette brands, Blu (owned by Lorillard) and V2 (owned by VMR). Their Twitter usernames are @blucigs and @v2cigs, respectively. As of February 2015, Blu and V2 are 2 of the top 3 e-cigarette brand websites based on activity, according to traffic tracker Compete (<https://www.compete.com>), with similarly high social

media activity. Blu also has the highest advertising expenditures, comprising over 75% of all e-cigarette advertising in 2012.²⁷ For each tweet, we counted how many times it was retweeted and collected profile information from the users who retweeted it, including the number of people who were following them, the number of people they were following, and the number of tweets they had posted. Only data that users have made available publicly have been included. No personally identifiable information is included in this study.

To identify flavor-related messages, we developed a list of search terms to be used in an automated content analysis. Prior to the study, approximately 1300 tweets, posted by any Twitter user, were collected by searching for “ecig” and “e-cig” on Twitter. These tweets were analyzed by human coders to identify ones that discussed flavor-related topics to develop the final list of terms, eg, buttery, menthol, chocolate, cinnamon, and so on. No tobacco flavor terms were included. Although menthol is still allowed in combustible cigarettes, and therefore, is not unique to e-cigarettes, we included menthol because many e-cigarette flavors contain mixtures of menthol and other flavors that are banned in combustible cigarettes. We used these terms to identify flavor-related posts by each of the e-cigarette brands.

The text for each tweet in our final dataset was inspected using the MySQL pattern matcher, a database-specific software function that can take a list of terms and scan a target dataset to determine if any of the terms appear, and then classify each tweet as “flavor” or “no flavor.” A random sample of the results was checked and validated by a human coder. Tweets posted by the e-cigarette brands also contained information on how many times they had been retweeted. Meta-data included a binary variable “isRetweet” that signified whether the message was originally posted by another user, and then retweeted by either Blu or V2.

We examined both directions of retweets (ie, brand tweets retweeted by users, and user tweets retweeted by brands), to determine whether flavor-related tweets were retweeted more often than non-flavor-related tweets. We used a chi-square test to compare the proportion of retweets by e-cigarette brands between the user-posted messages that mentioned flavor-related terms and those that do not (ie, retweets of users, by e-cigarette brands). A t-test was conducted to compare how often the flavor-related and non-flavor-related messages posted by e-cigarette brands were retweeted by other users (ie, retweets of e-cigarette brands, by users). Multiple logistic regression was used to test if the type of message being retweeted could be predicted by user profile data, including number of followers, the number of friends (ie, “followees”), and the number of posted tweets. This information is useful because it indicates the extent to which the retweeters are socially networked within the Twitter community, which could affect the reach and influence of the messages they post.

RESULTS

Tweets were collected for 6 months, from April 21, 2014 through October 20, 2014. In total, 1180 unique tweets were parsed for analysis, which included every message posted by Blu and V2 in the time period. Of the full sample, 909 were from Blu (77%) and 271 from V2 (23%). There were 127 total tweets (9%) from both brands that contained at least one of the

flavor-related search terms. Of those 127 tweets, 91 (72%) were retweeted by at least one other Twitter user. Additionally, 26 of the 127 (20%) were originally posted by another user and retweeted by one of the e-cigarette brands. From the 1053 tweets with no flavor-related terms, 663 (63%) were retweeted by at least one other Twitter user, and 114 (11%) were user-posted and retweeted. We did not conduct a systematic analysis of the content of non-flavor posts, but a cursory examination of a random sample revealed the majority of messages were focused on promotions and advertisements (eg, “Make 2014 even better with a Limited Edition V2 New Year's Kit: <http://t.co/uoDMty9ZT1>”) for various products, and responding to support requests (eg, “did you give our customer support a call? We can exchange these packs for you.”).

The association between retweets of user-posted messages by Blu or V2 and tweets that contained flavor-related terms was statistically significant, $\chi^2(1, N = 1180) = 10.08, p < .01$. Specifically, 20% of flavor-related tweets were retweeted, as compared with 11% of non-flavor-related tweets. The t-test also shows that there was a statistically significant difference in the mean number of retweets between messages posted by e-cigarette brands with flavor-related ($M=6.46, SD=8.95$) and without flavor-related ($M=4.76, SD=8.38$) terms; $t(154)=2.04, p = .04$. Cohen's effect size value ($d=.20$) suggested a small practical significance.

Both flavor and non-flavor messages were retweeted by 537 unique users; in many cases, users will retweet both types of messages. A multiple logistic regression showed no statistically significant results when testing the predictive ability of the user profile data of friends count, followers count, and post count on which type of message was retweeted (Table 1).

DISCUSSION

Retweeting behavior in Twitter can have several implications. In our study, retweeting serves 2 purposes. First, whenever a message posted by an e-cigarette brand is retweeted by another user, the message has reached a new network of users. Additional retweets can provide a cascading spread within and outside the poster's network and cause the message to go viral. The inherent benefit to the original poster is that the message can be seen by numerous users who do not follow their account, or were not familiar with e-cigarettes or e-cigarette flavors. This exposure through a retweeting network allows rapid diffusion of messages across groups.²² Although the mean number of retweets by followers of the e-cigarette brands was relatively low (6.46 retweets for flavor-related tweets and 4.76 retweets for non-flavor-related tweets), it is important to remember that the reach of these messages is likely to increase as they are retweeted by followers of the followers.

The second purpose comes from messages in the opposite direction, originally posted by any user, and then retweeted by an e-cigarette brand. There are several consequences to this action. Primarily, it serves a similar purpose as before, where new networks of users are now exposed to a localized message. In this case, the roles are reversed, allowing the e-cigarette community access to users who might be outside of the community, made visible by the retweet. Additionally, it can provide validation of the users' original tweet and help gain

reciprocity from other users.²⁸ These motivations are likely to help support and promote a company brand or product, with continued Twitter mentions and follows in the future.

This second level of networks, or “friends of friends,” can be critical due to an exponential reach and the inability to control what types of people are exposed to messages, potentially including adolescents and other vulnerable populations. Kwak et al's study of retweets¹⁹ illustrates the speed of diffusion in Twitter. “The strength of Twitter as a medium for information diffusion stands out by the speed of retweets.”^{19(p.599)} The rate of diffusion and ability to spread across social systems has implications for diffusing information to new and unintended audiences.

In this study, the likelihood of retweeting flavor-related postings was not statistically associated with Twitter user profile data, specifically their friends, followers, and post counts. These results nonetheless still have implications. Different types of Twitter users can be classified based on these profile data, such as influencers or followers.^{16–20} That there is no specific type of retweeter suggests that the messages are reaching – and being retweeted by – diverse Twitter users. The spread is not limited to influential persons with a large number of followers, or the heavy consumers that follow many people. The diversity of the retweeters indicates that the messages are reaching diverse external groups as well, with no connection to localized Blu and V2 sub-networks. However, we were not able to analyze variation in the likelihood of retweeting based on other user characteristics such as demographics, e-cigarette use, or position in the e-cigarette economy. Future studies should examine whether these characteristics affect retweeting behavior.

Limitations

This analysis only captured tweets that originated from or were retweeted by 2 e-cigarette brands. There are many other tweets about e-cigarettes propagating on Twitter, including those that are posted by individuals who both advocate for and against the products. We also were unable to provide concrete evidence that tweets about e-cigarettes and flavors are disproportionately reaching youth, nonsmokers, and other vulnerable populations, but these populations definitely exist among Twitter users and are not protected from seeing these messages. Additionally, the terms we use to define flavor-related posts can be refined and expanded. Whereas we recognize the limitations in our study, the results suggest that more in-depth investigations are needed to help understand the role of social media in spreading messages concerning e-cigarette flavors.

IMPLICATIONS FOR TOBACCO REGULATION

Over time, regulation of e-cigarette marketing could parallel the standards of more traditional tobacco marketing to limit exposure to youth and to curb misinformation. This is an issue that transcends national boundaries. The United States Food and Drug Administration (FDA) currently has no product standards, advertising restrictions, and overall, few restrictions regarding e-cigarettes. In 2016, the European Union will begin advertising bans, but indoor and outdoor use will not be regulated. However, the online world exists in muddier waters. There is no easy method to regulate retweets through social networks despite their potential to introduce e-cigarette advertisements and messages to

underage populations and nonsmokers. The Pew Foundation reported that 24% of online teens now use Twitter and the typical (median) teen has 79 followers.²¹ Inclusive of other social media, the Pew survey also found that 30% of teens report receiving online advertising that was “clearly inappropriate” for their age. Youth access to online marketing is not yet regulated by the 2009 Family Smoking Prevention and Tobacco Control Act governed by the FDA. These results suggest that e-cigarette marketing is distributed through Twitter by e-cigarette brands, and then redistributed both by users and these brands, creating a reach that extends beyond the original network. We suggest the FDA consider the types of tobacco-related content being circulated by e-cigarette brands and users, possible youth exposure, and appeal to youth through social media. Potential steps to reduce this appeal could include counter-marketing messages through these same channels, and correction of misinformation about the risks and benefits of flavors.

Human Subjects Statement

All data collected are publicly available (ie, any person with an Internet connection is able to view data that have been retrieved). Personal information such as email, phone number, or address was not collected. The study was reviewed by the University of Southern California Health Sciences Institutional Review Board and did not qualify as Human Subjects Research; therefore, it was not subject to the requirements of 45 CFR 46.102.

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Table 1

Summary of Retweet Profiles

Flavor-related	Yes (N = 162)	No (N = 503)	p-value	OR	95%	CI
Mean friends count	316	336	0.75	1.00	0.99	1.00
Mean followers count	257	515	0.24	0.99	0.99	1.00
Mean post count	12016	5907	0.33	1.00	0.99	1.00