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Vaping on Instagram: cloud chasing, hand checks and product placement

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Abstract

Introduction—This study documented images posted on Instagram of electronic cigarettes (e-cigarette) and vaping (activity associated with e-cigarette use). Although e-cigarettes have been studied on Twitter, few studies have focused on Instagram, despite having 500 million users. Instagram’s emphasis on images warranted investigation of e-cigarettes, as past tobacco industry strategies demonstrated that images could be used to mislead in advertisements, or normalise tobacco-related behaviours. Findings should prove informative to tobacco control policies in the future.

Methods—3 months of publicly available data were collected from Instagram, including images and associated metadata (n=2208). Themes of images were classified as (1) *activity*, for example, a person blowing vapour; (2) *product*, for example, a personal photo of an e-cigarette device; (3) *advertisement*; (4) *text*, for example, ‘meme’ or image containing mostly text and (5) *other*. User endorsement (likes) of each type of image was recorded. Caption text was analysed to explore different trends in vaping and e-cigarette-related text.

Results—Analyses found that *advertisement*-themed images were most common (29%), followed by *product* (28%), and *activity* (18%). Likes were more likely to accompany *activity* and *product*-themed images compared with *advertisement* or *text*-themed images ($p<0.01$). Vaping-related text greatly outnumbered e-cigarette-related text in the image captions.

Conclusions—Instagram affords its users the ability to post images of e-cigarette-related behaviours and gives advertisers the opportunity to display their product. Future research should incorporate novel data streams to improve public health surveillance, survey development and educational campaigns.

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INTRODUCTION

E-cigarettes are battery-operated devices that aerosolise a liquid that is inhaled by the user.¹ Awareness of e-cigarettes is high,² and their use, ‘vaping’, continues to grow.³⁴ E-cigarettes have evolved through several iterations,⁵ where today’s fourth generation devices, often called vapourisers, allow for custom modifications. As e-cigarettes rapidly evolve, novel data sources (eg, Google search queries, Twitter) are needed that can help document this dynamic industry and how people perceive and use these devices.

Data streams harnessed from the internet have been employed to help fill gaps in tobacco-related research, such as identifying trends in e-cigarettes,⁶⁷ informing tobacco control campaigns,⁸ and tobacco regulatory science.⁹¹⁰ However, Instagram—a social networking site focused on picture-based content—has been underused for these purposes.¹¹ Instagram allows users to capture and customise photos to share online. It has over 500 million active users, placing the site ahead of Twitter,¹² and is the second most used social media site by youth aged 13–17.¹³ Instagram’s image-focused content may provide insight into vaping-related activities and the introduction of new e-cigarette products. While studies have suggested the majority of e-cigarette-related Twitter messages are advertisements,¹⁴¹⁵ researchers have not explored image-based e-cigarette advertisement on Instagram. We investigated vaping and e-cigarette-related images on Instagram describing themes as well as users’ reactions through ‘likes’ and comments. We also explored the differences in what language people used to caption their vaping and e-cigarette images. Findings should inform the design of tobacco education campaigns and the development of future regulatory policies.

METHODOLOGY

Data collection and exploratory analysis

Data were collected through Instagram’s Application Programming Interface (API). All data collected were publicly available, that is, any person with an internet connection was able to view data at the time it was retrieved.

A preliminary list of 111 e-cigarette-related terms (eg, common terms, slang, brands, etc) was developed to filter posts and precision tests followed. Initial data collection was conducted in September 2015 to test the preliminary hashtags (ie, specific keywords preceded by the # sign), identify frequently co-occurring hashtags (ie, hashtags that appeared in the same caption as the root term), and resulted in a final list of the top e-cigarette and vaping hashtags: *#ecig*, *#ejuice*, *#eliquid*, *#vape*, *#vaping* and *#vapelifelife*. Using this final list of hashtags as root terms/search filters, primary data collection began on 1 October 2015 and concluded on 31 December 2015.

Image analysis of Instagram

From the sampling frame, 300 images were randomly selected to develop the coding scheme through an inductive process. Five themes were identified: (1) *activity*, for example, a person exhaling aerosol; (2) *product*, for example, a personal photo of an e-cigarette device or e-juice container; (3) *advertisement*, for example, a professional photo edited with embedded

text of a company name; (4) *text*, for example, image containing mostly text and (5) *other*, for example, not falling into one of the previous four categories. Additional coding of *other* images was conducted, and four subtopics were identified: (1) person or people; (2) sexually explicit imagery; (3) advertisement and (4) marijuana. After the themes were developed, the final sample of 2208 Instagram posts (images and captions) were randomly drawn and then coded by K-HC. The number of posts represented a ratio of one image for every hour of the data collection period. A second author (J-PA) coded a subsample (n=300), with high reliability (Cohen's $\kappa=0.907$). The separate subtopic coding of *other* images was also checked for, and found to have, high reliability (Cohen's $\kappa=0.918$). Categories were coded on the image itself. The caption text was consulted if there was potential for the image to be classified in multiple categories; no user account information was used. Kruskal-Wallis tests were conducted to determine if there were any significant differences in the number of likes or comments for each image theme, followed by Dunn's tests for pair-wise comparisons.

Topic exploration

To further explore how the hashtags were represented on Instagram, raw counts of the three e-cigarette and vaping hashtags were compared. A separate analysis was conducted by collecting the top 100 hashtags that co-occurred with one or more of the original six root term hashtags, and then each new hashtag was classified as being related to e-cigarettes (the product), vaping (the behaviour) or neither. A caption could read, 'I like vaping #vape #morning #newyorkvaper'. From that caption, the count for #vape would increase; then, #morning and #newyorkvaper would be collected as co-occurring hashtags and categorised. Reliability of the two coders was high (Cohen's $\kappa=0.82$). Comparisons of the co-occurring hashtags determined if usage of the root term hashtags discussed related (eg, #vapecommunity) or unrelated (eg, #love) topics. Statistical analyses were conducted using MySQL database queries, NVivo V.10 and Stata V.12.

RESULTS

There were 1 600 058 pictures and captions collected from Instagram. There were no duplicates from co-use of hashtags. Table 1 reports the frequencies of each category found in the 2208 Instagram images. Of the e-cigarette-related postings (n=2208), *advertisement*-themed images were most common, followed by *product*, *activity* and then *text*. Figure 1 shows images representative of each relevant theme. In the *other* theme, the majority of images had no clear classification and spanned a variety of areas, including personal selfies, combustible tobacco use, screenshots, etc. The additional coding of *other* images (n=487) found: (1) 39% person or people; (2) 22% sexually explicit imagery; (3) 12% advertisement and (4) 11% marijuana. It is important to note that all of the additionally coded *other* images were unrelated to vaping or e-cigarettes (eg, an additionally coded advertisement image might be for hookah paraphernalia).

There was a significant difference in likes across themes ($\chi^2(4) = 128.516, p=0.0001$), as well as comments across themes ($\chi^2(4), p=0.0001$). *Activity*-themed and *product*-themed images had more likes and comments than *advertisement*-themed images (all $p<0.001$). *Product*-themed images received the highest number of likes and comments, while

advertisement-themed images received the fewest amount of likes, and *text*-themed images received the fewest amount of comments.

Hashtags containing a reference to clouds (eg, *#cloudchasing*) were seen in 52% of the captions from *activity*-themed images, with photos portraying a person, or persons, exhaling aerosol (figure 1A). Among *product*-themed images, the hashtag *#handcheck* appeared in 17% of captions and was associated with pictures of an e-cigarette device and/or e-juice bottle that someone held in their hand (figure 1B).

Instagram had 20 times as many posts with 1 or more of the 3 vaping hashtags (n=1 081 987) compared with posts with one or more of the three e-cigarette hashtags (n=53 313). These counts were non-overlapping, that is, messages could have one or more of the three vaping hashtags, but none of the three e-cigarette hashtags, and vice versa. Among the top 100 co-occurring hashtags, 60 were classified as related to vaping, 19 related to e-cigarette and 21 neither. Subtopics not classified in either category included Instagram-specific terms (eg, *#regrann*), promotions or advertisements (eg, *#giveaway*), marijuana (eg, *#420*) or health-related (eg, *#quitsmoking*). The top 10 most frequently co-occurring hashtags were all categorised as vaping.

DISCUSSION

Advertisement-themed images were common on Instagram. The practice of tobacco product advertisement through the use of images has been previously studied in print advertisements, cigarette packages,¹⁶ product placements in movies and TV, and internal industry documents.¹⁷ Instagram's inherent focus on images makes it a good platform for picture-based advertising. Research has suggested that tobacco company employees promote tobacco products by posting pictures of events and sales on social media, possibly to circumvent bans on certain forms of advertising.¹⁸ The present study's estimation of the amount of *advertisement*-themed images might be conservative, as we did not analyse the captions, and only images that were explicitly promoting a commercial product were considered advertisements. Instagram also provides marketers more access to teens than other social media platforms,¹⁹ a vulnerable population that is highly exposed to e-cigarette advertising.²⁰

Although *advertisement*-themed images outnumbered the other themes, there were more likes and comments for *activity*-themed and *product*-themed images. The number of *activity*-themed images—and its number of likes and comments—may speak to how vaping is perceived. In several posts, clouds of aerosol were exhaled to demonstrate skill in creating elaborate patterns. Similarly, there were *advertisement*-themed images that announced competitions for performing vaping tricks. The images of 'cloud chasing' could contribute to the normalisation of vaping, characterising the act as harmless and fun, and more common and accepted than it actually is offline.²¹ Research has consistently demonstrated the strong effect of peer influence and perceptions of peer norms on combustible cigarette use.^{22,23} However, tobacco education programmes have successfully combatted the effects of peer influence by addressing the associated social norms,^{24,25} a strategy that could be implemented on social media. Images that promote certain e-cigarette-related behaviours

(eg, holding contests for doing tricks) could negate gains made by tobacco control campaigns and may require media campaigns to describe the potential risks of e-cigarette use. Additionally, while the dangers of first and secondhand tobacco smoke are well documented,²⁶ e-cigarette aerosol is generally seen by many adults as not harmful, despite the fact that e-cigarette aerosol contains nicotine and carcinogens.^{227–29} Instagram could cause images of e-cigarette and vaping to be perceived as harmless.

Product-themed images had the highest percentage of likes and comments. Images were found depicting people holding an e-cigarette and/or bottle of e-juice in homes, cars, parks and many other locations. It is possible that these images were propelled by the latest generation of vapourisers, as their customisability afforded users the ability to create unique devices that they would want to share online (#handcheck). This trend is concerning because it may portray e-cigarettes as something regularly found in daily life and socially acceptable, and provides unsolicited marketing of an e-cigarette product. Given many Instagram users responded favourably to these types of posts (likes), it will be important to develop methods to redirect misperceptions and create new boundaries for e-cigarette-related marketing.

Findings from the topic exploration analysis showed that terms related to vaping, the activity, are more prevalent than terms related to e-cigarettes, the product. Similarly, co-occurring hashtags focused strongly on vaping as well. These findings support related research regarding the terms people use when searching for e-cigarettes online.⁶

Social media research on e-cigarettes has focused on using data from Twitter, with recent studies examining perception,⁹ awareness³⁰³¹ and advertising.¹⁰¹⁴ While sites such as Twitter were created before the ubiquitous use of smartphones, Instagram originated as a smartphone app, with features that rely on mobile devices that can take high-quality photos and have fast internet connections; when combined with vaping activities (eg, cloud chasing) that are best suited for real-time capture and sharing, it makes Instagram an ideal platform for e-cigarette users and provides ample data for researchers to explore.

Limitations

This study used the Instagram API to retrieve data, which only allowed access to images from publicly available accounts and types of accounts were not classified (ie, personal or business-related, male or female). During image classification, we did not examine the content of the comments that were posted to each image, however when an image could have belonged to multiple themes, the caption was used as a tiebreaker. This approach focused the analysis on the content of the image.

Concluding remarks

Instagram offers a platform for posting pictures of vaping activities and custom vapourisers that can be seen by others online. The e-cigarette-related themes identified in this study could inform the design of communication campaigns that aim to counter social norms about e-cigarettes, and the development of future tobacco regulatory policies. Future research should aim to further understand the potential risks of advertising and social normalisation of tobacco-related behaviours on Instagram.

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What this paper adds

Tobacco and e-cigarette companies have used pictures as successful advertising tools. However, Instagram, an image-focused social media site, has been underused in tobacco control research. We address this gap in the literature by identifying the themes of e-cigarette-related images posted on Instagram, studying the level of reactions (likes) being elicited by each theme, and examining trends.

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Figure 1. Images representative of each relevant category. (A) *Activity*, for example, a person blowing vapour; (B) *product*, for example, a photo of an e-cigarette, vapouriser, or e-juice; (C) *advertisement*, for example, a photo edited with embedded text of a company name; (D) *text*, for example, common ‘meme’ saying or text-based poster.

Table 1

Shows the description of the categorisations of the sample of 2208 Instagram images

Theme	n=2208 (%)	Likes (%)	Comments (%)
(a) Activity	404 (18)	7	0.17
(b) Product	616 (28)	8	0.20
(c) Advertisement	648 (29)	3 ^{ab}	0.07 ^{ab}
(d) Text	53 (2)	4 ^{ab}	0.04 ^{ab}
(e) Other	487 (22)	4 ^{ab}	0.09 ^{ab}

Likes are defined as, for a single image, the number of likes divided by the number of followers of the poster. The percentage reported is the median for each given category. Comments are similarly defined.

Percentages marked with a superscript letter (eg, ^a) indicate a statistically significant difference between that row and the row designated by that superscript letter (p<0.01).

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