

Characterising JUUL-related posts on Instagram

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ABSTRACT

Background JUUL, a high-tech, popular vaping device, was the first major electronic cigarette (e-cigarette) brand to incorporate social media into its marketing strategy. There is growing concern around the increasing use of JUUL and other electronic nicotine delivery devices among youth, and their potential to addict a new generation to nicotine. The current study analysed the amount and characteristics of JUUL-related posts on Instagram, a social media platform used frequently among youth and young adults.

Methods Hashtag-based keyword queries (n=50) were used to collect JUUL-related posts from the Instagram application programming interface, March 2018–May 2018. Using a combination of machine learning methods, keyword algorithms and human coding, posts were characterised as featuring content related to product promotion, nicotine and addiction, youth culture and lifestyle.

Results Keyword queries captured 14 838 JUUL-relevant posts by 5201 unique users. Over one-third of posts were promotional (eg, linked to commercial website) and 11% contained nicotine and addiction-related information. Approximately half of posts featured content related to youth (55%) or lifestyle (57%). Youth-related content or lifestyle appeals were also notably present within promotional posts and nicotine and addiction-related posts, respectively. Nicotine and addiction-related posts featured memes, hashtags (eg, #nichead, #juulbuzz) and tag lines (eg, 'more flavor, more buzz').

Conclusions Findings reveal a proliferation of JUUL-related content on Instagram, which focused on product promotion and nicotine and addiction that included youth culture and lifestyle appeals. Regulatory actions should focus on restricting promotional efforts for e-cigarette products, particularly on social media platforms where young people are a primary audience.

INTRODUCTION

Electronic cigarettes (e-cigarettes) are the most popular tobacco product among US youth and rates of current use among middle and high school students are growing at an alarming rate.^{1,2} From 2017 to 2018, past 30-day e-cigarette use increased by 48% among middle school students (from 3.3% to 4.9%) and 78% among high school students (from 11.7% to 20.8%).¹ This dramatic rise in youth use is likely driven by the increasing popularity of JUUL and JUUL-like products.¹

JUUL is a high-tech vaping device that resembles a computer flash drive and comprises a rechargeable battery and detachable 'pods', which are nicotine cartridges that come in several flavours.³ JUUL Labs claims that each pod contains 59 mg/mL of

nicotine, which represents one of the highest nicotine concentrations on the market.⁴ Following on the heels of the massive success of JUUL's product launch, several brands entered the market with JUUL-compatible or JUUL-like products that offer an even wider range of flavour options and higher nicotine levels.^{5,6}

Recent news coverage and research studies have highlighted growing concern over JUUL's popularity among teens.^{7–11} A 2018 study found that 6% of youth aged 15–17 years were current JUUL users and approximately 25% used JUUL on 10 or more of the past 30 days. Furthermore, this group was 16 times more likely to currently use JUUL compared with the group aged 25–34 years.¹⁰ JUUL may appeal to youth for a variety of reasons such as product design and flavour availability, use as a cessation tool or perceived safety.^{10,12–14} JUUL's increasing popularity among young people has prompted the US Food and Drug Administration (FDA) to take action against the company, including the seizure of marketing-related documents with specific interest in how the company may be targeting youth.^{2,15} Most recently, the FDA proposed changes that would restrict the sale of flavoured e-cigarettes (other than tobacco, mint and menthol), including JUUL, to age-restricted, in-person locations to reduce youth access.¹⁶

JUUL is currently a primarily US phenomenon. As of January 2019, JUUL captured 73.8% of the US e-cigarette market share.¹⁷ JUUL's growth in popularity was accompanied by innovative marketing strategies across social media platforms.¹⁸ JUUL was one of the first major retail e-cigarette brands to heavily incorporate social media rather than traditional media into its marketing strategy, with strong presence on platforms that disproportionately represent youth and young adults, like YouTube, Twitter and Instagram.^{13,18} Although JUUL removed its official Facebook and Instagram accounts in November 2018,¹⁹ evidence suggests that the company previously used these accounts to promote and retain followers, particularly for the product's launch campaign which featured youthful models.^{18,20} JUUL is also heavily promoted through smaller affiliate marketing campaigns from other online vendors which enhance its digital presence.¹⁸ Indeed, JUUL has become an eponym for a burgeoning category of vaping products.

Currently, companies do not face comprehensive marketing restrictions with respect to e-cigarette advertising and promotion in the US,¹³ and digital marketing of e-cigarettes on social media is unregulated.²¹ Without these restrictions, the vaping industry can aggressively market their increasingly diverse and innovative products, like JUUL and JUUL-compatible products to youth.



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Youth and young adults are some of the heaviest users of social media,²² and social media use can shape social norms around risk behaviours like alcohol or tobacco use, particularly for susceptible youth.^{23–26} Youth may be exposed to e-cigarette-related social media posts made by peer network members (eg, organic posts, paid influencer posts²⁰) or via promotional posts initiated by tobacco manufacturers and affiliate vendors.²⁵ Evidence suggests that youth exposure to any e-cigarette-related social media content is high²³ and may prompt e-cigarette use among adolescents and young adults.^{25 27 28}

A growing body of literature has examined e-cigarette-related content on social media sites like Twitter, Instagram and Pinterest and found common themes which highlight: (1) product promotion (eg, discount offers, free trials, links to commercial websites); (2) product reviews; (3) product customisation and (4) the social (eg, can use anywhere) and financial (eg, relative price) benefits of use.^{29–33} Due to its recent emergence on the marketplace, few studies have specifically examined JUUL-related content on platforms like Twitter, Instagram and YouTube.^{13 18 34} Across these studies, similar themes included ‘lifestyle’ (ie, depiction of a specific lifestyle like freedom or relaxation), product appeal (eg, flavours, looks like a flash drive, can use anywhere), peer-to-peer information sharing (eg, what is JUUL?) and nicotine dependence (eg, cravings, addiction).^{13 18 34} Although this research elucidates the dominant content themes, these studies generally only used data from a subset of JUUL-related accounts or posts and elaboration on the characteristics of promotional or nicotine and addiction-related content was limited. Additionally, since these studies were conducted, JUUL’s US market share dramatically increased from 50% in early 2018 to almost 70% by springtime.^{35 36}

Given the growth of JUUL sales volume and the increasing alarm over its popularity among youth and potential to create a new generation of users addicted to nicotine,³⁷ examining a more comprehensive and contemporary sample of social media content is critical to informing the current policy debate around JUUL and JUUL-related product use among youth. The current study analyses the amount and characteristics of JUUL-related content specific to product promotion, references to nicotine and addiction and the overlap between these two themes on Instagram, a popular social media platform among youth and young adults.²² Furthermore, we identify the amount and proportion of content featuring youth and lifestyle appeals emphasising the social acceptability of vaping or ‘JUULing’ and the extent to which these themes also overlap with promotional and nicotine-related themes. The tobacco industry has historically used lifestyle and social acceptability appeals to market tobacco products, particularly to youth.³⁸ Examining these appeals, as well as youth-related, promotional and addiction-related content, can further characterise JUUL’s social media marketing presence. Results can inform policy makers on how social media can influence youth risk behaviour and identify strategies to counter digital marketing for JUUL and other popular e-cigarette brands.

METHODS

Data acquisition

Hashtag-based keyword queries were used to collect JUUL-related posts from the Instagram application programming interface (API) through NUVI, a licensed syndicator of the Instagram firehose. Instagram was selected because it is popular among teens³⁹ and has three times the number of monthly active users compared with other popular platforms, like Twitter.⁴⁰ Posts were retrieved from 1 March 2018 to 15 May 2018. During

this time-period, JUUL’s share of the e-cigarette market grew from 56.1% to 64.0%.^{36 41} The NUVI Instagram API delivered a collection of de-duplicated posts matching one or more search rules in the body of the *primary* Instagram post. Unlike APIs for Twitter social data acquisition, commentary or replies to the primary post were not matched against search rules and thus were not included in the total message volume count. The unit of analysis for this study was a primary Instagram post.

Due to the relative rigidity, short life and lack of flexibility of hashtag-based queries, a limited set of 50 search terms was used to retrieve data. To identify potentially relevant hashtags, we used Websta.me Instagram analytics website, prior literature and research team expert consensus based on knowledge of JUUL-related terminology and brands. Sample hashtag search terms included #juul, #juuling, #juulvapor, #juulpod, #switchtojuul and #juulgang (complete list in online supplementary table 1). We also included all posts by the official JUUL account (@juulvapor) and JUUL-related accounts with the highest number of followers at the time of data collection: @juulcentral, @juulnation, @juul_university, @juul.girls and @juul.tv.¹⁸

Relevance

The JUUL keyword filters retrieved JUUL-relevant as well as JUUL-irrelevant posts because many unrelated accounts use JUUL-related hashtags to piggy-back on JUUL’s status as a trending topic. To efficiently remove irrelevant posts and construct an analytic data set consisting of relevant posts, we built a machine learning classifier that was trained on a human-coded sample of the data retrieved with the 50 keyword filters. Two coders rated a random sample of 1500 primary posts for JUUL-relevance based on both the visual and language components of each post. Sampling was stratified by week of posting to ensure the training sample covered the entire study period. Word unigrams (ie, single word) were extracted from the text associated with each post and very common terms (present in >80% of all posts) were dropped. Since many irrelevant posts used JUUL-related hashtags, we also extracted the number of total hashtags and the number of hashtags that contain the strings ‘juul’ or ‘vap’ per post as features for classifier training. Linear support vector machine (SVM) combined with bagging was trained; bagging helps reduce variance and improve accuracy by taking multiple bootstrap samples of the training data and averaging the predictions over the multiple samples. Since eliminating irrelevant data is an important first step, we enhanced the classifier’s performance by using bagging. To assess the performance of the classifier, 10-fold cross-validation was used.^{42–44} Classifier accuracy was 0.92; classifier recall (sensitivity) was 0.92; classifier precision (positive predictive value) was 0.92 (F1=0.92). The classifier precision approximates retrieval precision (the proportion of the analytic data that are actually relevant to the topic of JUUL), which indicates the quality of the analytic data.⁴⁵

Content analysis

Next, we classified all primary JUUL-relevant posts based on the following content categories: promotion; nicotine and addiction; lifestyle and youth-related appeals. For each category, two human coders rated a sample of primary posts based on text and imagery to construct training samples. Initially, language-based filters were developed to identify each of the four themes but poorly performed for promotion, nicotine and addiction, and youth; therefore, machine learning classifiers were employed to identify those three themes. For classifier training, word unigrams, bigrams (ie, two adjacent words) and trigrams (ie,

three adjacent words) from textual content were extracted, including usernames and hashtags. Terms that were too common (present in >80% of all posts) or too infrequent (present in <5 posts) were dropped because those were not informative to train classifiers. For lifestyle or social norms and acceptability content, we developed a language-based filter to categorise content. The content categories were not mutually exclusive, and a post could be coded as featuring multiple themes.

Promotional content

First, we classified the relevant posts as those containing promotional or marketing content and those not containing such content, that is, 'organic' posts. Promotional posts were conservatively defined by the presence of any of the following: branded promotional messages; URLs linking to commercial websites and hashtags indicating affiliations with commercial sites. Two human coders rated a training sample of 1104 primary posts as 628 promotional and 476 organic posts. Resultant data were used to train logistic regression with L1 regularisation; 10-fold cross-validation was applied to assess classifier performance. Classifier precision was 0.84; recall was 0.84; area under the curve (AUC) was 0.89 (F1=0.84).

Nicotine and addiction-related content

In addition, we classified relevant primary posts as those containing nicotine and addiction-related content and those without such references. More specifically, nicotine-related posts were defined by the presence of any references to nicotine, including compatible pod-related brand names and nicotine content, as well as any references to addiction or nicotine dependence (eg, daily use, being an addict, junkie, 'nichead', fiend, maniac), or effects of nicotine use (eg, 'buzz'). Two human coders rated a training sample of 1104 primary posts as 333 nicotine-related and 771 non-nicotine-related posts. Resultant codes were used to train logistic regression with L1 regularisation; 10-fold cross-validation was applied to assess classifier performance. Classifier precision was 0.81; recall was 0.70; AUC was 0.90 (F1=0.75).

Youth-related content

Messages characterised as containing youth-related appeals featured any references to youth-generated content (eg, evidence that the message authorship can be attributed to youth through use of youth-specific language, peer or place-specific references or youth-oriented media) or content features appealing to youth, including stylistic features such as jargon or slang, acronyms common among youth (eg, di4j, doit4juul), youth-oriented genres or media of expression (eg, memes [ie, short, distinctive phrase or image replicated and shared online],⁴⁶ cartoons,⁴⁷ JUUL wrap imagery, youth entertainment, music), references to school, the classroom and other places frequented by youth and references to youth social networks, family and peers. The training sample contained 528 youth-related and 305 non-youth-related posts. An SVM with radial kernel was trained, and parameters were optimised by grid search. Classifier precision was 0.82; accuracy was 0.83; recall was 0.85 (F1=0.83) via 10-fold cross-validation.

Lifestyle, social norms and acceptability-related content

Finally, lifestyle or social norms and acceptability-related messages contained any mentions of online or offline communities and peer groups (eg, collegelife, juulgirls, juulgang, vapeusa, collegedaily, vapelyfe hashtags) as well as JUUL use during

social activities, events, social acceptance of JUULing and any mentions of JUULing as a characteristic of cultural or social identity. We developed a language-based filter to identify posts related to lifestyle content (see online supplementary table 1 for search terms). To assess the performance of the filter, we pulled a random sample of 780 posts classified as JUUL-relevant and coded for lifestyle-related content; precision was 0.84 and recall was 0.86 (F1=0.85).

We present the proportion and number of posts by each thematic content area and provide text and images of exemplar posts. Additionally, we show the proportion of promotional and nicotine and addiction-related posts, respectively that contain content from the other three thematic areas (eg, proportion of promotional posts that also contain youth-related content). Finally, we provide the top hashtags and URLs mentioned across the classified posts by each thematic area.

RESULTS

Our list of hashtag-based keywords captured 40 071 primary posts made by 6945 unique users over the data collection period of March 2018–May 2018. Of these, 14 838 primary posts made by 5201 unique users were classified as JUUL-relevant (37.0%).

About one-third of JUUL-relevant primary posts (34.3%, n=5086) were classified as promotional. These posts featured overt JUUL promotion, as well as giveaways and direct user engagement strategies, including incentivised friend-tagging. A sample post by Juul.Girls account stated: 'GIVEAWAY. 1. Tag your fav juul partner & have them tag you back. 2. You and your friend like the post. 3. Must follow @juul.girls to be eligible'.

Approximately 11% of JUUL-relevant posts (n=1656) were estimated to contain nicotine and addiction-related content. Nicotine-related posts featured discussion of the amount, taste and effects (eg, buzz, satisfaction, addictiveness) of salt-based nicotine. For example, a cartoon image of the popular Buzz Lightyear character stated, 'when you're buzzin hard' (figure 1). Nicotine and addiction-related posts featured memes and hashtags regarding addiction and the effects of nicotine use (eg, #nichead, #juulbuzz, #morningbuzz) and compared the

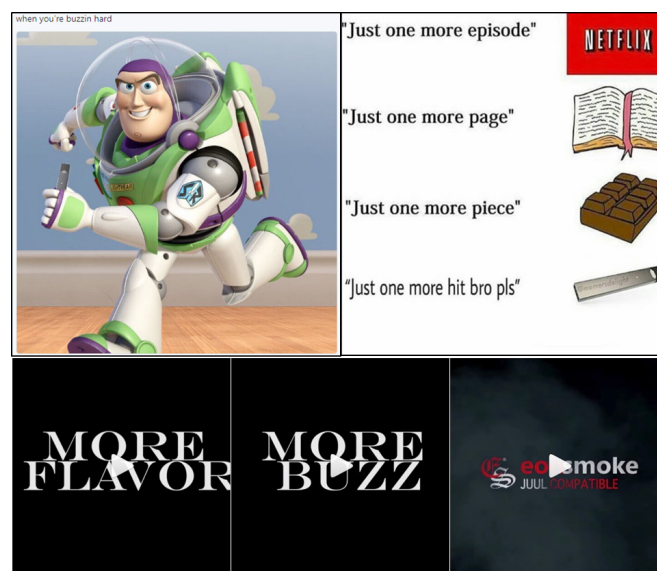


Figure 1 (Top row) Sample nicotine and addiction-related memes. (Bottom row) Screen shots of promotional tag lines featuring nicotine appeals by Eonsmoke, a manufacturer of JUUL-compatible flavour pods.

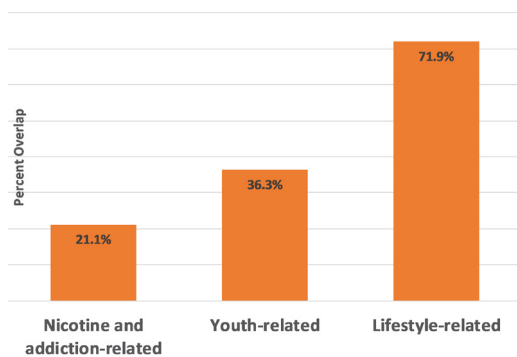


Figure 2 Overlap of promotional content with nicotine and addiction-related, youth-related and lifestyle-related themes.

addictive nature of nicotine to craving chocolate, addiction to video games, or binge-watching television shows (figure 1).

Over half of JUUL-relevant conversations (55.4%, n=8227) contained youth-related content, including memes, cartoon imagery (eg, figure 1), flavours, wraps, stealth vaping in class or at home, musician/celebrity references (eg, use by Katy Perry, Jennifer Lawrence, Lil Skies rap artist, etc), and use at school and other places frequented by youth. For example, one JUUL user who also plays the popular video game, Fortnite posted: 'Fortnite+Juul in class definitely equals a W Follow @juul_gang_(username) for more! #doitforjuul #di4j #juul #juulvapor #juulgang #juulpods...'.

Approximately 57% (n=8399) of JUUL-relevant posts mentioned lifestyle-related content. Examples of such discussions include: '[F]rom coworkers to roomies to juul sisters 🍷💕 #inthishousewehonorandcherishthejuul #broughttogetherbyjuulitself #vapers #vapelite #juulers #juul...' and 'Let's get matching juuls is the new let's get matching tattoos' #juul #passmyjuul #juulfam #juulpods #pods #chargemyjuul...'.

Figure 2 shows the amount of overlap between promotional content with the other three themes, including nicotine and addiction-related content. Among promotional posts, 21.1% mentioned nicotine and addiction and over one-third (36.3%) contained youth-related content. It is noteworthy that 71.9% of promotional posts contained lifestyle-related content. Figure 3 illustrates the overlap between nicotine and addiction-related content with promotional, youth-related and lifestyle-related content. Findings revealed that 64.9% of nicotine and addiction-related posts were also promotional. Furthermore, 86.3% of nicotine and addiction-related posts contained references to lifestyle-related content.

Across the thematic content areas, the most popular URLs were for websites that sell or advertise vaping products (table 1). Examples of these online retailers include saltnic.com, eonsmokepods.com and coolvapestore.com. JUUL's official website was included only among the top sites listed for nicotine and addiction-related content. Nearly all posts (86.8%, n=12 885) contained the hashtag #JUUL. Top hashtags mentioned in youth-related messages included #juulgang (27.9%, n=2295) and #juulcentral (12.9%, n=1064), as well as #vapenation (17.4%, n=1438) and #vapetricks (16.1%, n=1321). Additionally, the top hashtags featured in promotional posts included references to co-use with marijuana (eg, #420, #710).

DISCUSSION

This study offers key insights into how product information is disseminated within social media applications to promote

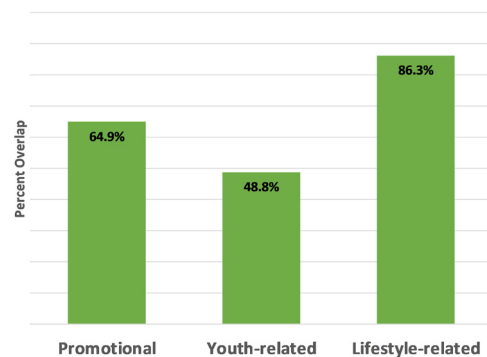


Figure 3 Overlap of nicotine and addiction-related content with promotional, youth-related and lifestyle-related themes.

products like JUUL. Instagram appears to be an important promotional platform for JUUL, with more than a third of JUUL-related posts containing overt promotional content that highlights ways to obtain products at reduced cost, such as give-aways and incentivised friend-tagging. This finding is consistent with previous research which found that Twitter users employed person-tagging (eg, @username) when purchasing JUUL, suggesting friend-tagging plays an important role in motivating product use.³⁴ Younger users may be more exposed to JUUL promotional posts compared with older adults, especially given Instagram's popularity among young people^{39 48} and prior evidence that JUUL-related social media posts are viewed and shared by adolescents.⁴⁹ As prevalence rates of e-cigarette use continue to rapidly rise among youth, strong regulatory action is needed to restrict promotional efforts within digital platforms with high youth usage.

Interestingly, our study found that the most common URL links included affiliate vendor websites (eg, eonsmokepods.com), which promote products through sponsored, cross-platform marketing campaigns.⁵⁰ This finding aligns with prior research documenting a notable presence of innovative, cross-over marketing campaigns on Instagram from other JUUL-affiliate vendors.¹⁸ These posts underscore the need for future digital marketing restrictions that consider how and to what extent parent brand activity is linked to messages from affiliate vendors and accounts promoting similar products. Affiliate vendors may be more likely to engage with social media users to directly promote products, particularly now that JUUL has taken down several of its official social media accounts.¹⁹

Overall, we found a relatively low proportion of posts related to nicotine content. However, there was a notable proportion of nicotine and addiction-related posts that also contained lifestyle-related content, which has relevant implications for creating social norms around product use and maintaining social acceptance of nicotine use and dependence. The use of branded tags and tag lines to define the sought-after effects of JUUL use (eg, 'juul buzz') observed in this study, along with the direct comparison of JUUL use to other commonplace addictions like binge-watching Netflix or eating chocolate, can all serve to romanticise and in effect, normalise the repeated use of JUUL as a typical feature in one's lifestyle. A similar light-hearted treatment of addiction and nicotine was identified in a discussion of JUUL use among Twitter users,¹³ and our results are consistent with previous research of hookah-related content on Twitter which found that users often discussed hookah dependence in terms of craving, wanting or loving hookah—terms that could serve to normalise online conversations about product use and

Table 1 Top hashtags and linked website URLs by content theme area

Lifestyle		Promotion		Nicotine		Youth	
Top hashtags	Top links	Top hashtags	Top links	Top hashtags	Top links	Top hashtags	Top links
juul	mollyllamavapes.com	juul	mollyllamavapes.com	juul	marinavape.com	juul	mollyllamavapes.com
vape	juul.tv	vape	saltnic.com	vape	coolvapestore.com	vape	marinavape.com
juulvapor	saltnic.com	vapelife	marinavape.com	vapeporn	eonsmokepods.com	juulgang	juul.tv
vapenation	marinavape.com	vapenation	eonsmokepods.com	vapetricks	saltnic.com	juulvapor	eonsmokepods.com
juulgang	coolvapestore.com	vapetricks	coolvapestore.com	saltnic	stigpods.com	juulpods	solmfg.com
vapelife	eonsmokepods.com	vapeporn	stigpods.com	vapelife	drop.buzz	juulnation	drop.buzz
vapetricks	stigpods.com	vapelyfe	solmfg.com	vapelyfe	solmfg.com	vapenation	mightyvapors.com
vapeporn	uptown-tech.com	juulvapor	cityofvapors.com	juulvapor	ave40.com	vapetricks	smokenstufhouston.com
juulpods	solmfg.com	420	smokenstufhouston.com	juulgang	juulvapor.com	juulcentral	wrapbeasts.com
juulnation	vapenews.com	710	mightyvapors.com	vapehooligans	xl vape.com	vapelife	luxeproductusa.com

potentially influence offline behaviour.⁵¹ These findings bear a striking resemblance to the tactics used by the traditional tobacco industry to promote smoking as a socially acceptable behaviour and normalise the ‘positive aspects of smoking and nicotine’.⁵²

Collectively, these results demonstrate the broad need for youth focused countermarketing efforts to re-frame the normalisation of nicotine addiction by discussing the potential harm in relation to JUUL and other emergent e-cigarette products. Moreover, the predominant themes of youth and lifestyle highlight the importance of JUUL as a brand and as an eponymous product category in youth culture, particularly through the use of cartoons, memes, celebrities and music that appeal to youth. Importantly, findings documented discussions of JUUL use at school which is consistent with prior research.³⁴ Findings also indicate that JUUL was promoted to specific community identities through the use of JUUL-specific hashtags (eg, #juulgang) and more general hashtags associated with the vaping community (eg, #vapenation).⁵³ The use of these hashtags, along with user tagging can establish and further amplify social bonds and shared beliefs around vaping.⁵³ Similar to tobacco control efforts for combustible tobacco products, these results demonstrate the critical need for youth-focused public education efforts to inform youth of the serious health effects and harms of nicotine addiction related to e-cigarette products. This is particularly relevant given the lack of awareness of nicotine presence in JUUL pods among youth and young adults.¹¹

This study has several limitations. First, we focused on posts from Instagram from March to mid-May 2018. Our findings may not generalise to other time periods but offer a cross-section of JUUL-related posts during a time-period where the product was growing in popularity. Second, the list of hashtags we used to retrieve JUUL-relevant posts was comprehensive but may not have included all JUUL-relevant, especially rare, hashtags and posts during this time-period. Third, since Instagram no longer provides data on the number of followers and level of influence at the account-level, we were limited in our ability to identify the reach of specific messages. Furthermore, this study used a conservative definition of promotional posts and did not categorise the presence of paid social influencer accounts, potentially under-reflecting the amount of promotional posts. Pending data availability, future studies should investigate what role influential accounts play in promoting JUUL use on Instagram.

CONCLUSION

The growing popularity of JUUL and JUUL-related products among US youth and young adults raises serious concerns that

the product could promote a new generation of nicotine addicts, particularly among those who would otherwise never have used a combustible product.³⁷ Results from the current study indicate the pervasive dissemination of promotional JUUL-related content on Instagram by employing messages that included themes of youth culture and lifestyle appeals. Given that social media is an important platform to communicate with youth and young adults, strong regulatory action is needed to restrict promotional efforts for e-cigarette products, particularly within social media platforms where youth and young adult participation is high.

What this paper adds

- ▶ E-cigarettes are commonly promoted and discussed on social media platforms popular among youth and young adults.
- ▶ JUUL is a popular high-tech vaping device and there is concern that JUUL and the burgeoning category of JUUL-like e-cigarettes could addict a new generation of users
- ▶ Due to its recent emergence on the marketplace, only a few studies have examined JUUL-related content on social media; these studies used a sample of accounts or posts and included limited discussion of the characteristics of promotional or nicotine-related content.
- ▶ The current study analysed the amount and characteristics of promotional and nicotine-related content among a corpus of JUUL-related content on Instagram from March 2018 to May 2018.
- ▶ Results revealed a proliferation of promotional posts and posts related to nicotine and addiction that tied into youth culture and lifestyle appeals using memes, hashtags (eg, #nichead, #vapenation), tag lines (eg, ‘more flavor, more buzz’) and promotional friend-tagging.
- ▶ These findings further refine and characterise JUUL’s social media marketing presence.
- ▶ Strong regulatory action is needed to restrict promotional efforts for e-cigarette products, particularly within social media platforms where youth participation is high.

Correction notice The second bullet point in the box entitled ‘What this paper adds’ at the end of the article is amended as follows: ‘JUUL is a popular high-tech vaping device and there is concern that JUUL and the burgeoning category of JUUL-like e-cigarettes could addict a new generation of users’.

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All authors contributed to revising the manuscript and approved the final version for submission.

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