Developing a theoretical marketing framework to analyse JUUL and compatible e-cigarette product promotion on Instagram

Ganna Kostygina,1 Hy Tran,1 Lauren Czaplicki,2 Siobhan N Perks,3 Donna Vallone,4,3 Sherry L Emery,1 Elizabeth C Hair3

ABSTRACT

Background E-cigarette promotion on social media coincided with the rapid growth of e-cigarette use among American youth, particularly with the increased JUUL pod vapouriser use. We examined commercial JUUL-related messages on Instagram to identify marketing appeals used to target users along the continuum of e-cigarette use; we mapped the appeals to existing theoretical marketing frameworks to better understand industry strategies.

Methods Hashtag-based keyword rules were used to collect JUUL-related posts from the Instagram application programming interface, 1 March–13 November 2018. Posts were classified as commercial or non-commercial. A combination of machine learning methods, keyword algorithms and human coding were used to characterise message themes in commercial posts.

Results Keyword filters captured 50,817 relevant posts and 41% were commercial. Among commercial posts, 91% contained recruitment/trial-based appeals (eg, combustible tobacco cessation; product sampling; giveaways) and 71% featured reinforcement/addiction-related appeals (eg, loyalty programmes). None of the commercial messages contained e-cigarette cessation-related appeals and less than 25% mentioned quitting combustible tobacco as a recruitment appeal.

Conclusions Instagram posts featuring e-cigarette related marketing can increase exposure to persuasive messages encouraging e-cigarette trial and use particularly among susceptible youth. Stronger regulations are needed to prevent exposure to social media marketing among young social media users.

INTRODUCTION

The steady progress in reducing youth tobacco use in the USA was reversed by the recent exponential increase in adolescent e-cigarette use.1–3 Since 2014, e-cigarettes have been the most commonly used tobacco product among US middle and high school students.2 Following the introduction of higher nicotine-content e-cigarettes like JUUL, e-cigarette use rose dramatically from 11.7% in 2014 to 27.5% in 2019 among high school students.1 The earlier a person initiates nicotine use, the more likely they are to develop a severe and persistent addiction.5,6 Addressing the risk factors of youth tobacco use, including exposure to social media tobacco marketing, is essential to reducing rates of experimentation and progression to established use.

One risk factor for youth e-cigarette use is exposure to social media tobacco product marketing.1–10 Emerging research on social media marketing demonstrates that youth are frequently exposed to tobacco marketing on social media platforms,11 and never tobacco users who engage with social media marketing have greater susceptibility to use tobacco in the future.12 Youth consume social media at higher rates than the general US population,13 which can increase their exposure to targeted social media marketing directly by companies or shared indirectly through peer networks.

E-cigarette product vendors employ innovative methods of ‘social selling’, including social media native advertising and influencer promotion. These messages are currently unregulated, often target youth, feature branded merchandise and use celebrity or influencer promotion.15–17 In particular, the recent rise in JUUL’s popularity among young people followed a considerable increase in JUUL product social media promotion.16–18–19 Content analyses of posts featuring JUUL-related terms revealed themes appealing to youth and novice users while trivialising addiction.19

Marketing strategies used to promote JUUL and the numerous JUUL-compatible or copycat devices that emerged following JUUL’s success often parallel approaches used by major cigarette manufacturers to promote cigarettes to youth in the 1970s and 1980s. Internal tobacco industry documents from this period reveal how tobacco companies used opinion leaders as trusted sources of information for youth. These opinion leaders recruited younger users and novices, promoting a cigarette brand to their followers or marketing smoking as a pathway to ‘participation, togetherness, and membership in a group’.20–22

Effects of marketing on initiation, progression to heavier use and overconsumption

Due to the addictive properties of tobacco products, additional considerations are necessary to
understand how tobacco companies’ social media marketing strategies influence adolescents’ trial, initiation and progression to heavier tobacco product use. Two theories of marketing provide valuable frameworks for analysing the types of tobacco marketing appeals that appear on social media.

According to Ehrenberg’s ATR theoretical framework, three steps can account brand choice behaviour: (1) gaining awareness of a brand, (2) making a first or trial purchase and (3) being reinforced into developing and keeping a repeat buying habit. Awareness can be created through advertising. A trial purchase can arise for a variety of reasons: a cut price offer, unavailability of the consumer’s usual brand, exposure to an advertisement or display, free samples or an attractive short-term promotion. Following trial, a repeat buying habit may develop, which is the crucial determinant of long-term sales and is primarily ‘a matter of reinforcement after use’. Thus, repetitive advertising reinforces a habit. According to this framework, the ‘consumer does not have to be persuaded to think of his habitual brands as better than others, but has to be reinforced in thinking of them as at least no worse’.

The ATR theoretical framework, however, does not account for the specific effects of addictive products, such as tobacco, alcohol or other substances. A growing body of literature on addictive product marketing identifies marketing cues that influence users at varying stages of dependence and impact user progression along an addictive product consumption continuum. Furthermore, marketing cues can desensitise consumers to the risks and dangers involved with the use of potentially addictive products such as e-cigarettes or cigarettes.

While there are several frameworks that define the stages of addiction, the underlying motivational factors fall into three major transitional stages: the transition from nonuse to ‘near-addictive’ use; the transition from ‘near-addictive’ to ‘addictive’ or regular use; and the transition from addiction or regular use to cessation or nonuse. In the first stage, message cues rely on peer influence and other forms of social reinforcement to increase the appeal of product trial. For those in the transition from, many factors may contribute to transition from ‘near-addictive’ to ‘addictive’ use, such as stress relief or the sensual pleasure associated with use (ie, euphoria of getting high). Marketing cues that facilitate progression to the addiction phase relate to cravings and ways to manage consumption and product purchase. Finally, the transition from ‘addiction’ or regular use to cessation or non-use is a stage where messaging aims to encourage and support cessation. Cues include appeals to quit, communication about risks and messages that discuss the cost of addiction.

A crosswalk of the ATR framework for product choice and consumption and the theoretical framework of addictive consumption based on stages of addiction is presented in table 1. Understanding how addiction marketing cues (or cues encouraging regular use of potentially addictive products) are used in commercial e-cigarette social media content can provide meaningful insights for tobacco control, including the specific marketing strategies used to promote these products among novices and existing tobacco product users. In the current study, we synthesise Awareness, Trial and Reinforcement (ATR) and Addiction Marketing frameworks to examine JUUL-related messages on Instagram and classified posts based on addiction marketing cues that targeted users across the types of nicotine product marketing. The synthesised approach enables a fine-grained systematic analysis of brand promotion strategies, parsing out youth-oriented and new user-oriented messages and established user-oriented marketing and helps better understand attributes of these messages that can impact behaviour change and advance the evidence base for tailored intervention and regulatory efforts.

We focused our analysis on JUUL-related messages given its dominance in the class of pod-based nicotine delivery devices and the use of #juul by compatible or competitive product brands to gain exposure on social media. Instagram was selected due to its popularity among youth and its relatively high engagement rate compared with other social media platforms. Results from this research can inform regulatory strategies to restrict or reduce commercial marketing on social media platforms.

**METHODS**

**Data acquisition and processing**

Data were retrieved from the Instagram application programming interface (API) using hashtag-based keyword queries through NUVI, Inc, a licenced syndicator of the Instagram firehose. To identify potentially relevant hashtags, we used Websta.me Instagram analytics website, prior literature and extensive knowledge of JUUL-related terminology and brands. Sample hashtag search terms included #juul, #juuling, #juul-addict, #juul-vapor, #juulpod, #switchtojuul and #juulgang. Our set of 54 JUUL-related hashtag-based search terms retrieved 144 939 primary posts from 1 March 2018 to 11 November 2018. While the Instagram data included the body of the post and associated metadata, commentary or replies to the primary post were not included in the total message volume count due to the API restrictions for Instagram data acquisition. Therefore, the unit of analysis for this study was a primary Instagram post.

**Table 1  Theoretical approach synthesis**

| Awareness, Trial and Reinforcement (ATR) Framework | Stages of addiction framework | Sample marketing strategies |
|----------------------------------------------------|-------------------------------|-----------------------------|
| Gaining awareness of a brand | Transition from nonuse to ‘near-addictive’ use | Marketing cues connecting lifestyle imagery with product use (including paid product placement, native advertising and endorsements among influencers and lifestyle accounts); event sponsorship |
| Making a first or trial purchase | Transition from ‘near-addictive’ to ‘addictive’ use | Demonstrations of how to use the product, product sampling; product giveaways, branded merchandise giveaways, discounts |
| Being reinforced into developing and keeping a repeat buying habit | Transition from ‘addiction’ to cessation or nonuse | Loyalty programmes to encourage more frequent purchases, honouring loyal users with coupons, larger unit packaging, daily engagement messaging featuring shopping deals |

Kostygina G, et al. Tob Control 2023;32:e192–e197. doi:10.1136/tobaccocontrol-2021-057120 e193
Data cleaning

In order to assess whether captured posts were actually relevant to JUUL and related products and behaviours, and thus to accurately measure the volume of the social conversation about JUUL over time, we built a machine classifier (linear support vector classifier) that was trained using human coding. Two coders rated a random sample of 619 primary posts, stratified by week of posting. Coders evaluated JUUL-relevance based on both the visual and text components of each post. The classifier used text features and the human labels to identify patterns related to relevance. To assess the performance of the classifier, 10-fold cross-validation was used. Classifier accuracy was 0.94; classifier recall (sensitivity) was 0.94; classifier precision (positive predictive value) was 0.95 (F1=0.94). The classifier precision approximates retrieval precision (ie, the proportion of the analytic data that are relevant to the topic of JUUL), which indicates the quality of the analytic data. Posts that were classified as irrelevant messages were removed to construct the final analytic data set, which included 50 817 JUUL-relevant posts by 16 323 unique users.

Content analysis

First, we classified posts in the analytic dataset t as either ‘commercial’ or ‘non-commercial’. Commercial posts were defined by presence of any of the following: branded promotional messages; URLs linking to commercial websites; usernames indicating affiliations with commercial sites; or user’s account page consisting only of promotional posts. Non-commercial posts were those deemed non-sponsored; they reflected individual opinions or experiences or linked to non-promotional content. Two human coders rated a training sample of 1104 primary posts as commercial (n=628) or non-commercial (n=476). Resultant data were used to train a logistic regression classifier 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 was 0.89 (F1=0.84).

Table 3 lists the top hashtags included in commercial posts by marketing strategies. TTM is a supervised machine learning method, which is used to systematically discover topics of specific interest in a large corpus, enabling us to avoid ‘suppression’ of rare topics that might otherwise occur due to lower prevalence of these topics. We used R package ‘mallet’ to generate the top 20 topics. For each topic, weights were assigned to indicate the relative importance of terms featured.

RESULTS

Keyword filters captured 50 817 relevant posts by 16 323 unique users (figure 1) from March to mid-November 2018. The number of daily JUUL-related posts remained relatively stable over time (figure 1), with a slight decrease in the number of posts made during the month of July 2018 compared with other months. Approximately 41% of retrieved messages were commercial (n=20 873).

Among the commercial posts, 91% (n=19 022) contained awareness and trial or nonuse or near-addictive use (type 1) appeals. These posts included messaging that connected lifestyle references with tobacco use; featured paid product placement or endorsements by celebrities and influencers. In addition, these posts offered free sampling or giveaway opportunities and promoted sponsored events. Approximately 25% (n=4818) of type 1 commercial posts contained content targeted towards users trying to quit combustible tobacco product use.

Nearly 71% (n=14 838) of commercial posts featured appeals related to reinforcement or near-addictive to addictive use (type 2). These included offers to buy products in bulk at a discounted rate, loyalty programmes to encourage more frequent purchases and honouring loyal users with mentions or shout-outs. Finally, none of the commercial posts contained reduced nicotine content appeals or addiction/regular use to cessation or nonuse promotion related to e-cigarette cessation (type 3).

Table 2 displays the top 20 topics and associated terms with highest probability to be part of each topic derived from the TTM analyses. Overall, 11 topics were associated with marketing related to awareness and trial. Topics included marijuana-related promotion, community or peer appeal, discussion of JUUL products and flavors, mechanisms to buy e-cigarettes online, starter kits, event promotion (eg, #vapenights, #goodvibes) and appeals to switch from combustible to electronic cigarettes. A total of nine topics were associated with marketing related to reinforcement and topics included chargers, brands, local vaping communities, discussion of nicotine and nicotine salt, product accessories (eg, #vapeskin) and use with other combustible products, including marijuana. No topics were associated with e-cigarette or JUUL cessation (type 3).

Table 3 lists the top hashtags included in commercial posts by marketing strategy along the addictive product promotion continuum. The top six hashtags overlapped across groups;
however, hashtags for new user-related content (type 1) contained more JUUL brand references compared with the posts featuring addicted user-related content. Marketing associated with stage 1 or awareness and trial also contained hashtags related to JUUL-specific community groups, while marketing associated with reinforcement (Type 2) featured more general non-branded, vape community-related hashtags. None of the commercial messages contained e-cigarette cessation-related appeals; however, the commercial posts potentially targeting new users (type 1) mentioned quitting combustible tobacco and other substances as a recruitment appeal and featured such hashtags as #smoke (n=2722), #420 (n=1282) and #detox (n=920).

**DISCUSSION**

The rapidly rising popularity of high nicotine e-liquids threatens to addict a new generation of youth. The current epidemic of e-cigarette use among American middle and high school students could erase decades of tobacco control progress. Social media posts featuring JUUL, JUUL-compatible or copycat product marketing can increase exposure to e-cigarette messaging and promote addictive product use among susceptible youth.

Our findings indicate that most of the promotional content (over 90%) contained awareness and trial appeals to new and non-addicted users. A large proportion of content also featured reinforcement cues targeting potentially addicted e-cigarette users (over 70%). These findings are consistent with prior evidence on marketing strategies used by tobacco companies to promote cigarettes among youth and new users, while at the same time appealing to existing users. In this study, we observed marketing messages targeted to non-users that contained references to JUUL brand and JUUL-specific community groups, which can enhance brand recognition among novices and connect the brand to lifestyle content via different JUUL-specific community posts. For reinforcement content targeting existing

| Stage | Topic rank | Topic label | Text: top terms |
|-------|------------|-------------|-----------------|
| Type 1: awareness and trial | 1. | Marijuana-related cross-promotion | #blunts, #bongs, wax, sales |
| Type 1: awareness and trial | 2. | Community/peer appeals | #vapefriends, #vapelam, #vapelifestyle, #vapecommunity, #vapenation |
| Type 1: awareness and trial | 3. | Juuling | #juullife, #juulang, #juulnation, #juulmemes, #juulwraps, #juultricks |
| Type 1: awareness and trial | 4. | Online stores/sales | online, store, vapour, #cbdvape, #highlife |
| Type 1: awareness and trial | 5. | JUUL line extensions | silver, classic, flavours, mango #cool, mint |
| Type 1: awareness and trial | 6. | Smoker targeting | #vapeordie, #smoke, vaping, hookah, #nokotricks |
| Type 2: reinforcement | 7. | Chargers | jili, #jilibox, box, rechargeable, #collegedays, #vapaddict, #doitforstate, charger, #vapehappy |
| Type 2: reinforcement | 8. | Pod vapouriser brands | #suorin, #suorindrop, #bovaping, #aspirebreeze, #vanger, reviews, #fire, #mrsalty |
| Type 1: awareness and trial | 9. | E-commerce | #21andover, ebay, price, #ecig, prices, shout, sale, #ecigwholesale |
| Type 1: awareness and trial | 10. | CBD (cannabidiol) and cannabis | cbd, #girlsboxing, #cannabis, #hemp, #cbd, #710, #420 |
| Type 2: reinforcement | 11. | Local user appeals | #indyvape, #vapeaholic, #indianavape, #vapingstyle, #dripclub |
| Type 2: reinforcement | 12. | Nicotine salt | #nicotinesalt, #nicotinesalts, #saltnews, salt, nicotine |
| Type 2: Reinforcement | 13. | Nicotine | nicotine, addictive, %, eonsmoke pods, #collegelife, #juice |
| Type 2: reinforcement | 14. | Stig pods | #stigpods, #tricklyfe, #teamcoolsmoketricks, @stigpods |
| Type 1: awareness and trial | 15. | Kits | #love, kits, starter, come, available |
| Type 2: reinforcement | 16. | Mods and skins | #vapemode, #vapemods, #vapeskin, #vapewrap, camo, coils, decal, #twistedcoilvapes |
| Type 2: reinforcement | 17. | Combustible products | #backwoods, #pipes, Cubano, #dailystoner, #smoketeam, #559stoners |
| Type 1: awareness and trial | 18. | International promotion | Browse, #vapeitaly, france, #vapeindonesia, #versace, #louisvuitton, distributor |
| Type 2: reinforcement | 19. | Cross-promotion | #rollingpaper, #lighters, #cigs, #wholesaleorders, #paper, #waterpipe, #smoking |
| Type 1: awareness and trial | 20. | Event promotion | #goodvibes, #halloween, #nabovibes, #rock, #punk, #vapenights |

**Table 2** Top 20 topics and associated terms from commercial JUUL-related Instagram posts by stage of addictive product use/marketing target group (1 March to 11 November 2018)

| Overall commercial content | Number of posts | New user targeting/awareness and trial content (type 1) | Number of posts | Existing user targeting/reinforcement content (type 2) | Number of posts |
|---------------------------|-----------------|------------------------------------------------------|-----------------|------------------------------------------------------|-----------------|
| juul                      | 19302           | juul                                                  | 17634           | juul                                                  | 13927           |
| vape                      | 13857           | vape                                                  | 12951           | vape                                                  | 10263           |
| vapelife                  | 9578            | vapelife                                              | 9487            | vapelife                                              | 7499            |
| vapenation                | 7520            | vapenation                                            | 7240            | vapenation                                            | 5942            |
| vapoporn                  | 6413            | vapoporn                                              | 6185            | vapoporn                                              | 5291            |
| vapetricks                | 5400            | vapetricks                                            | 5190            | vapetricks                                            | 4562            |
| juulvapor                 | 5039            | juulvapor                                             | 4702            | juulvapor                                             | 4212            |
| juulpods                  | 5039            | juulpods                                              | 4674            | juulpods                                              | 3729            |
| vapelyfe                  | 4438            | vapelyfe                                              | 4370            | vapelyfe                                              | 3542            |
| juulnation                | 4269            | juulnation                                            | 4250            | juulvapor                                             | 3444            |
users, posts primarily mentioned the general, non-branded vape community, potentially fostering a sense of belonging to vaping communities and reinforcing a user’s identity as a ‘vaper’.

It is noteworthy that topics associated with targeting new users (type 1) included cross-promotion with marijuana products (potentially appealing to marijuana users), flavours (traditionally used to recruit new users of tobacco products), aspirational fashion or designer brand references, event promotion and appeals to combustible product users. Content associated with existing user marketing (type 2) included references to personalisation of JUUL products (eg, through use of decals or skins), alternative or compatible pod brands and references to increased nicotine use or overconsumption (modifying product strength: #dripclub, #vapemod, coils, #twistedcoilvapes; daily use; vape tricks). Finally, no content mentions of e-cigarette cessation appeals were found within the study data. When considered against the overwhelming amount of new user and addiction or regular user-related marketing, this finding further highlights that JUUL and JUUL-like devices are marketed as tobacco products meant to recruit new users and maintain nicotine consumption.

Recent corporate social responsibility campaigns by tobacco and nicotine/e-cigarette product manufactures (eg, the Delivering a Smoke-free Future campaign by PMII), campaigns, promoting ‘reduced risk’ tobacco or nicotine products would imply that such campaigns would feature a category of marketing messages facilitating opt-out options of tobacco product use. However, we found no commercial messages that could be interpreted as providing opt-out options or that described a pathway to non-use. Given the very limited presence of tobacco use prevention or tobacco use cessation messages on social media platforms, youth face a vastly disproportionate media environment.

Limitations

Generalisability of this study’s findings reflects the nature of data collected through the Instagram API, which has been severely restricted since April 2018. Study findings may not generalise to other time periods, but they offer a cross-sectional representation of JUUL-related posts during a time period where the product was growing in popularity. The list of hashtags we used to retrieve JUUL-relevant posts was comprehensive but may not have included all JUUL-relevant hashtags and posts during this time period. Finally, since Instagram no longer provides data on the number of followers and level of influence at the account level, we were unable to identify the reach of specific messages. This study did not categorise the presence of paid social influencer accounts, potentially under-representing the amount of promotional posts. Future studies should investigate e-cigarette marketing strategies that target subgroups of non-addicted and addicted users, as well as the role of paid influencers on Instagram.

CONCLUSIONS

The tobacco industry has been adept at shifting strategies to avoid the restrictions imposed by the Master Settlement Agreement in the USA, as well as advertisement regulations existing in other countries, by taking advantage of viral marketing on media platforms popular among youth. Tobacco and nicotine product use on social media occupies a significant presence across these platforms. Tobacco companies successfully employ messaging strategies that raise awareness of products, encourage trial and reinforce use, providing a clear path from nicotine naivety to initiation and addiction but offer no support out of addiction. Tobacco control media campaigns can fill this messaging gap by offering messaging that describes a pathway out of addiction, providing at least some counterbalance to massive amount of highly effective tobacco industry promotional messages. While social media platforms attempt to restrict some forms of tobacco advertising and promotion, these policies are difficult to enforce and are frequently evaded because tobacco and nicotine product promotion on social media often occurs via influencer posts and organic word of mouth. A policy that limits or eliminates branded accounts and influencer marketing of tobacco products could substantially reduce the likelihood that brand mentions and hashtags could gain virality in organic posts. Such efforts should be supported by tobacco control media campaigns to counterbalance the potential influence of social media marketing on adding a new generation to tobacco use.

What this paper adds

⇒ We examined JUUL-related content on Instagram to identify and quantify commercial messages featuring marketing cues targeting users across three stages of nicotine addiction (recruitment of non-addicted users, promotion of heavier use/addiction and cessation).
⇒ The majority of JUUL-related commercial posts contained recruitment-based appeals, such as product sampling, giveaways or combustible tobacco and other product cessation references, and a large proportion of posts also featured addiction-related appeals, including loyalty programmes. None of the commercial messages contained e-cigarette cessation-related appeals.
⇒ Instagram e-cigarette related posts can increase exposure to persuasive messages promoting initiation and prompting or reinforcing progression to heavier use and overconsumption, particularly among susceptible youth who are present on social media. Stronger regulations can curb exposure to social media marketing among novices and young people.

Twitter Sherry L Emery @sherryemery and Elizabeth C Hair @ehairphd

Contributors GK, LC, SLE, DV and ECH together designed the study; HT and GK conducted data analysis; SLE, GK, LC and SNP contributed to data interpretation; GK wrote the first draft; SLE, LC, SNP, DV and ECH revised the draft; the final version of the paper has been reviewed and approved by all coauthors. GK acts as a guarantor.

Funding This study was funded by National Cancer Institute (R01CA248871) and Truth Initiative.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study does not involve human participants.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data may be obtained from a third party and are not publicly available. The data were obtained from NUVI, Inc, a licenced syndicator of the Instagram firehose.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID iDs Ganna Kostygina http://orcid.org/0000-0002-8416-6168
Siobhan N Perks http://orcid.org/0000-0002-4982-6327
Donna Vallone http://orcid.org/0000-0001-9841-9333
Sherry L Emery http://orcid.org/0000-0001-9278-9990

Kostygina G, et al. Tob Control 2023;32:e192–e197. doi:10.1136/tobaccocontrol-2021-057120
