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Characterizing KandyPens-related posts to Instagram: Implications for nicotine and cannabis use

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Abstract

Background: This study analyzed posts to Instagram related to KandyPens, an open-system pod mod e-cigarette company, marketing its products as aromatherapy devices. The objective was to determine themes, corresponding user profiles, and references to types of e-liquid solutions used with KandyPens.

Methods: Data consisted of publicly available posts to Instagram with the hashtag "#kandypens" collected from June 8 to August 8, 2018 (n=1775). Identified themes included: *Product appearance* (e.g., highlighting design features including color of device), *User experience* (e.g., vape tricks), *Flavors* (e.g., strawberry), *Promotions* (e.g., $10 off). The type of e-liquid *solutions* (nicotine, aromatherapy, and cannabis) used with KandyPens were also recorded. Instagram profiles were categorized into: *Vaping enthusiast/advocates*, *Influencers*, *KandyPens' official Instagram account*, *Vape vendors*, and *Average Instagram users*.

Results: *User experience* (28.90%) and *Product appearance* (21.80%) were predominant themes followed by *Promotions* (10.08%), and *Flavors* (1.01%). About 32.43% of posts referenced cannabis-related solutions, 2.98% of the posts mentioned nicotine-related solutions and 0.11% of the posts mentioned aromatherapy. *Average Instagram users* (24.89%) posted the majority of posts followed by *Vape vendors* (20.72%), *KandyPens'* official account (17.96%), *Vaping enthusiasts/advocates* (10.75%) and *Influencers* (0.45%).

Conclusion: KandyPens markets its products as aromatherapy devices, however, Instagram posts related to these products rarely mentioned their purported purpose. Future research should consider product design, user experience, and the co-use of nicotine and cannabis with KandyPens to assess implications related to product appeal and abuse liability.

What this paper adds

- We content analyzed Instagram posts related to KandyPens, an open-system pod mod e-cigarette company, marketing these products for aromatherapy purposes.

- *User experience* and *Product appearance* were predominant themes.

- References to aromatherapy-related solutions were rare.

- Open-system pod mods (such as KandyPens) appear to be at the intersection of nicotine and cannabis use.

Introduction

Pod mods, rechargeable electronic devices that aerosolize e-liquid solutions,[1] account for 40%-70% of the e-cigarette retail market.[2] Open-system pod mods, in particular, are modifiable devices compatible with a range of e-liquid solutions such as nicotine or cannabis solutions. Research has linked some of these types of solutions with cardiovascular and respiratory issues. [1, 3-5] The ability to modify devices may have implications for product appeal, especially among teenagers and young adults.[6, 7]

KandyPens, a company manufacturing open-system pod mods, has been noted for its popularity among youth.[8] Initial evidence points to KandyPens' marketing strategies such as product placement in music videos that potentially enhance youth exposure to their line of products.[9] However, more research is

needed to examine user experiences with KandyPens products to explore implications for nicotine addiction and/or abuse liability.

In 2018, the Food and Drug Administration (FDA) noted that KandyPens' sale of nicotine products was occurring in the United States without the mandated premarket authorization.[10] In their response to the FDA, KandyPens argued that their products are not sold with nicotine and are meant for aromatherapy purposes only.[11] Social media surveillance, in this context, can inform tobacco control and the FDA in particular about the purported purpose of KandyPens and characterize themes of KandyPens-related posts as communicated by KandyPens' customers and vendors.

Instagram offers multi-contextual content (images and text) that provides useful insights about user experiences with tobacco products. For example, Laestadius and colleagues found that few e-cigarette-related posts to Instagram mentioned vaping in the context of health benefits.[12] Allem and colleagues found that marijuana, product promotions and smoking experiences were predominant themes among little cigar-related posts to Instagram.[13] Another study examined Instagram posts related to hookah and found themes pertaining to polysubstance use behaviors and cross promotions of tobacco and alcohol.[14] Kostygina and colleagues revealed ways in which Trendsettah, a cigar and cigarillo company, promoted marijuana flavors on Instagram .[15]

The current study characterized KandyPens-related posts to Instagram to determine themes of posts, identify which type of e-liquid solutions are used with KandyPens' products, and describe the Instagram user profiles responsible for each post.

Methods

Data collection

Data consisted of publicly available Instagram posts with the hashtag "#kandypens" collected from June 8 to August 8, 2018. Hashtags are used as file folders to organize conversations on social media platforms like Instagram and play an important role in contextualizing social media communication.[13, 14, 16] Netlytic, an Instagram-approved vendor that accesses the public application programming interface (API) of Instagram, was used to collect data which is similar to previous Instagram studies.[16] Netlytic retrieves the first 100 posts per hour. If the number of posts associated with a hashtag exceed the threshold of 100, Netlytic collects the most recent posts that received a comment. The initial sample for this study consisted of (n=2125) posts. Posts unavailable subject to user account closure, and/ or change in privacy settings, or deleted by the time of coding (n=349), were excluded from the sample, resulting in an analytic sample of (n=1775) posts from 546 unique accounts.   All study procedures were performed under Institutional Review Board approval from the authors' university.

Coding strategy

The unit of analysis consisted of the image and its associated caption. Investigators worked collaboratively to become familiar with the data, then generated a coding frame and identified commonly appearing categories. The purpose of the approach was to condense the raw image-based data into summary format and report the underlying patterns that were evident in the data.

Themes of the posts included: (a) *Product appearance* (e.g., highlighting color and graphics on the product, pairing products with everyday accessories), (b) *User experience* (e.g., vape tricks, sensory experience of the products), (c) *Flavors* (e.g., mentions of "mint" or graphics indicating flavors such as "strawberry"), (d) *Promotions* (e.g., mentions of discounts), and (e) *Other* (included posts that did not fit naturally into one of the above mentioned categories, e.g., posts promoting consumer electronics, music concerts).

Posts were also coded for references to at least one of the following types of e-liquid *solutions*: (a) *cannabis-related solutions* (e.g. marijuana, CBD, 420, or ganja), (b) *nicotine-related solutions* (e.g., nicotine salts), (c) *aromatherapy-related solutions* (explicit mentions of solutions used for aromatherapy, e.g., #aromatherapyliquid), or (d) *no solutions*.

Instagram user profiles associated with each post were categorized into one of the following: (a) *Vaping enthusiast/advocate* (e.g., the account name mentions vaping or cannabis-related terms but does not sell products), (b) *Influencer* (e.g., the account promotes KandyPens by explicitly stating it using specific hashtags such as '#ad" "#sponsored"), (c) *KandyPens*' official Instagram account, (d) *Vape vendor* (profile description explicitly indicates that the user offers vape products for sale and may encourage people to contact them for more details on their products) , (e) *Average Instagram user* (the account name does not mention vaping related terms and does not appear to be a promoter of KandyPens), and (f) *Other* (e.g., accounts without a description).

Two investigators coded posts; a subsample (n=213, 12% of overall sample) was double-coded to determine reliability. Coding agreement was acceptable ranging from 95% to 99% (Cohen's kappa: 0.85 to 0.96).

Results

Themes highlighting *User experience* (28.90%) and *Product appearance* (21.80%) were the most predominant followed by posts classified as *Promotions* (10.08%), and those highlighting *Flavors* (1.01%) (Table 1). About 32.43% of the posts had references to *cannabis-related solutions*, 2.98% of the posts had *nicotine-related solutions* and 0.11% of the posts had *aromatherapy-related solution* references. Majority of the posts were posted by *Average Instagram users* (24.89%) and *Vape vendors* (20.72%) followed by *KandyPens'* official account (17.96%), *Vaping enthusiasts/advocates* (10.75%) and *Influencers* (0.45%).

Table 1. presents descriptive statistics associated with each of the categories coded (N=1775)		
Category	**%**	**n**
Theme		
User experience	28.90	513
Product appearance	21.80	387
Promotions	10.08	179
Flavors	1.01	18

Other	38.20	678
Type of e-liquid solutions		
Cannabis-related solutions	32.38	575
Nicotine-related solutions	2.98	53
Aromatherapy-related solutions	0.11	2
No solutions	64.53	1146
User Profile		
Average Instagram user	24.89	442
Vape vendor	20.72	368
KandyPens official account	17.96	319
Vaping enthusiast/advocate	10.75	191
Influencer	0.45	8
Other	25.23	448

Discussion

KandyPens-related posts to Instagram often displayed themes related to *User experiences*, *Product appearance*, *Promotions*, and *Flavors*. These posts also contained cannabis-related terms more so than aromatherapy-related or nicotine-related terms. KandyPens-related posts to Instagram were often posted by *Average Instagram users*, *Vaping enthusiasts/advocates,* or *Vape vendors* suggesting communications on Instagram may play a part in KandyPens' growing popularity. Policy makers and those in tobacco control could turn to Instagram to understand what drives the appeal of tobacco products to inform counter campaigns and regulations.

Depictions of the user's experience on Instagram may normalize vaping on social media.[17, 18] This is particularly concerning in the case of open-system pod mods because of their compatibility with a wider range of nicotine concetrations.[4] Posts highlighting *Product appearance* may be important attributes that appeal to youth and young adults.[19] Posts referencing *Flavors* highlight the extent to which open-system pod mods, like KandyPens, offer flexibility of use in terms of

compatibility with a range of e-liquid solutions and possibly other substances offered by a variety of manufacturers. Counter campaigns can spread awareness about risks of exposure to attractive open-system pod mod appearance and flexibility of use among vulnerable youth. Additionally, in line with previous research, sales promotions (including price discounts, offers, giveaways) continue to be predominant among tobacco-related posts to Instagram.[20]

Categorizing Instagram user profiles is key to describing the nature of engagement associated with posts related to KandyPens. Previous evidence suggests that engagement with tobacco-related social media information is associated with tobacco use[21, 22] and/or low support for e-cigarette regulations.[23] *Average Instagram users* and *Vape enthusiasts/advocates* alike can extend conversations by demonstrating novel open-system pod mod use to their followers.[24] Vape v*endors*, another predominant group among social media message authors,[12] [25] likely expose their followers to new and emerging vape products.

Our findings on the type of e-liquid solutions used with KandyPens products has direct implications for tobacco control. Although KandyPens products are marketed as aromatherapy products, Instagram posts about these products rarely mention their intended purpose and few associated posts highlight flavors. Open-system pod mods such as KandyPens, although not marketed as tobacco products, can potentially be used for vaping nicotine e-liquid solutions. Our findings suggest that cannabis-related references were more predominant than nicotine-related references or even no-references among KandyPens-related posts. As noted in previous research, substantial cannabis-related references on Instagram raise concerns about potential over-consumption, normalization of cannabis-use, and associated health risks.[26] Past work also demonstrates that cannabis use is

associated with tobacco use,[27] and products like KandyPens may facilitate co-use between nicotine and cannabis and is an area of future research. Regulatory mechanisms may need to take into account the evolving architecture of vaping devices that have implications for nicotine use and dependence, even though select open-system pod mods like KandyPens are not always promoted as tobacco products.

Limitations

Findings from this study may not generalize to other social media platforms or other time periods. Future research should investigate the nature of KandyPens on Twitter and Reddit as text-based data may offer additional insights. Our findings pertain to KandyPens and may not generalize to other companies offering similar products. While KandyPens is suggested to be popular among youth,[9] the present study did not determine the demographics of those discussing KandyPens on Instagram. Additionally, Instagram users making their posts unavailable or deleting them is a characteristic of social media use and may introduce bias in the results if the deleted content is relevant to this research.

Conclusion

This study examined KandyPens-related posts to Instagram to describe themes and the accounts taking part in these online communications. Themes of images, type of e-liquid solutions, and Instagram user profiles identified in this study could inform the design of counter campaigns designed to curb the appeal of open-system pod mods to youth and young adults, and the development of future tobacco control policies. Future research should examine KandyPens' product

design characteristics for implications associated with abuse liability, including the

co-use of nicotine and cannabis with KandyPens.

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Contributions

JPA received funding for the study. JPA and AM conceived of the study and oversaw

content analysis procedures. AM analyzed all study results and drafted the initial

manuscript. JPA, TC, JBU, and MK revised the manuscript for important intellectual

content. All authors have approved the final manuscript.

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