



# Vaping on TikTok: a systematic thematic analysis

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## ABSTRACT

**Introduction** The rising popularity of TikTok among adolescents may influence their awareness and perceptions of e-cigarette use via user-generated content. This study aimed to examine how e-cigarette/vaping-related videos are portrayed on TikTok.

**Methods** The nine most viewed hashtag based keywords were used to identify popular e-cigarette/vaping-related videos on TikTok (n=1000) from its inception (earliest upload date: January 2019) to November 2020. Five researchers independently coded the number of views, likes, user category and theme.

**Results** A final sample of 808 e-cigarette/vaping-related videos that met study criteria were included. Collectively, these videos were viewed over 1.5 billion times, with a median view count of 1 000 000 (range 112 900–78 600 000) and a median 'likes' count of 143 000 (range 10 000–1 000 000). A majority of the videos portrayed e-cigarette use *positively* (63%; collectively viewed over 1.1 billion times). *Neutral* depictions of e-cigarette use were viewed a total of 290 million times (24%) and *negative* depictions of e-cigarettes were viewed a total of 193 million times (13%). The video themes included (not mutually exclusively): 'comedy and joke' (52%; total of 618 million views), 'lifestyle and acceptability' (35%; 459 million), 'marketing' (29%; 392 million), 'vaping tricks' (20%; 487 million), 'nicotine and addiction' (20%; 194 million), 'creativity' (16%; 322 million) and 'warning' (11%; 131 million).

**Conclusion** Our findings illustrated that positively framed e-cigarette and vaping-related postings available without age restrictions on TikTok—a rising video-sharing platform that is popular among adolescents—have been viewed many times. Effective age restrictions are needed to reduce adolescents' potential exposure to videos that portray vaping positively.

## INTRODUCTION

Use of electronic cigarettes (also known as e-cigarettes or personal vaporisers) has increased among adolescents.<sup>1</sup> For example, the prevalence of past 30-day e-cigarette use among USA high school students increased threefold from 9.3% in 2014 to 27.5% in 2019.<sup>2</sup> Emerging evidence suggests that vaping has detrimental effects on the developing brain, lungs and heart.<sup>3</sup>

Adolescents (aged 13 to 18 years) are particularly susceptible to peer influence<sup>4</sup> that is increasingly exerted via social media, use of which is ubiquitous among adolescents in high income countries.<sup>5</sup> Adolescents are routinely exposed to e-cigarette endorsements from peers and influencers on Twitter, Instagram and Facebook.<sup>6–8</sup> Studies

indicate that exposure to e-cigarette marketing and user-generated e-cigarette-related content on social media is associated with a greater likelihood of future e-cigarette use among adolescents.<sup>9 10</sup>

TikTok is the fastest growing platform worldwide, attracting 800 million monthly users, and a third of users in the USA are aged 14 or younger.<sup>11</sup> TikTok is a publicly available video-sharing platform that allows users to create short video clips related to dancing, lip-synching, talent and other trends. Due to its unique appeal,<sup>12</sup> users on average spend 52 min and watch more than 200 videos per day.<sup>13</sup> TikTok's community guidelines restrict uploading videos featuring 'the depiction, promotion, or trade of drugs or other controlled substances'. Advertising of tobacco and alcohol products is also prohibited on the platform.<sup>14 15</sup> This study systematically assessed the content of popular e-cigarette/vaping-related videos on TikTok.

## METHODS

### Sampling strategy

In September 2020, a snowball sampling procedure<sup>16</sup> produced 157 vaping-related hashtags that TikTok creators used to promote videos by directing users to a page of uploaded videos, each of which showed the number of views received. All videos could be streamed by the general public. We identified the top viewed hashtags based on the number of views on 17 November 2020 (online supplemental table 1). This procedure is based on a previous TikTok content analysis.<sup>17</sup> The top nine vaping-related hashtags identified were '#vape', '#vapetricks', '#juulgang', '#puffbar', '#nicotine', '#vapenation', '#vaping', '#vapeshop', and '#vapelife'. Another potentially highly viewed hashtag, '#immuneupvapedown', was excluded because the tagged videos were played on a loop, artificially increasing the number of views.

A stratified random sampling method<sup>18</sup> collected publicly available URL links for the top-viewed vaping-related videos (n=1000) from the inception of TikTok (earliest upload date January 2019) to November 2020. The URL for the top viewed vaping-related videos were extracted by ranking hashtags according to their number of views. We then calculated the proportion of views accounted for by each hashtag and the number of URLs we needed to extract to provide a sample size of 1000. The inclusion criteria for videos were (1) related to vaping and (2) under the top vaping-related hashtags. The final sample contained 808 videos, after removing duplicates (n=121) and videos unrelated to vaping, despite their hashtag (n=71)



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**Table 1** Summary of key results and definitions used for coding depiction type and themes (n=808)

	Definition	Number of videos (%)	Collective number of 'views'	Collective number of 'likes'
Depiction type				
Positive	Promoting/encouraging e-cigarette use	512 (63.4%)	1 088 819 800	140 781 900
Neutral	Ambiguous/no clear position towards e-cigarette use	191 (23.6%)	290 304 400	49 701 500
Negative	Discouraging/deterring e-cigarette use	105 (13%)	193 244 800	32 639 700
Themes*†				
Comedy	Employs humour and joke when depicting e-cigarette use	421 (52.1%)	617 865 800	108 394 600
Lifestyle and acceptability	Mentions of online or offline communities and peer groups (eg, juulgang), social activities, events, social acceptance, mentions of vaping as a characteristic of cultural or social identity	282 (34.9%)	459 031 700	63 734 400
Marketing	Promotional activity that could seek to maximise the impact of a brand or a commercial enterprise	230 (28.5%)	391 694 300	52 502 300
Vaping tricks	Performance of vaping tricks (eg, blowing large vapour clouds or shapes like rings)	160 (19.8%)	486 856 100	584 000 000
Nicotine and addiction	Reference to addiction or nicotine	159 (19.7%)	193 954 800	29 459 000
Creativity and tips	Step-by-step instructions and 'how to' videos (eg, how to use, maintain a vaporizer, do-it-yourself recipes, hiding vapes, purchasing vapes)	130 (16.1%)	322 390 500	34 789 600
Warning	Warning viewers of the dangers and negative health consequences associated with e-cigarette use	86 (10.6%)	130 825 500	19 295 100
*Videos could be classified into one or more of these themes (not mutually exclusive). †All the themes were binary coded (eg, yes or no).				

(online supplemental figure 1). Non-English language videos were included in the analysis (n=73).

### Coding procedures

A codebook was developed based on themes generated from a random subset of 100 videos (online supplemental method 1) and calibrated with previously conducted analyses of e-cigarette-related content on social media.<sup>15 19 20</sup> The codebook is publicly available on GitHub (<https://github.com/tiantianhua/tiktok>) and definitions for each theme are presented in table 1. Dataset is available on request.

Five researchers (TS, LD, BC, CT and JC; aged from 22 to 30 years) were trained using a subsample of 50 videos to establish interrater reliability. The videos in the sample were accessible by TikTok accounts created with an account holder age set to 15 years. Each researcher watched/streamed 200 videos in full and read their captions to independently code the video themes, e-cigarette depiction type (positive, negative, neutral) and the perceived age group ( $\leq 18$ , 19–25, 25+ years) and gender (male, female, non-binary, not applicable) of the primary presenter in the video. Videos could be classified into one or more of these themes, all of which were binary coded (yes, no). Coding for non-English language videos was based on visual interpretation, or audio and caption, which was translated into English text using Google Translator.<sup>21</sup> The kappa ( $\kappa$ ) measure of initial agreement for each theme and for perceived age on a random subset of 100 videos ranged from  $\kappa=0.64$  to 1. All disagreements were resolved after discussion. The number of views and likes were used as a proxy for popularity<sup>22</sup> and these metrics were rounded by TikTok. The video themes and metrics were summarised using descriptive statistics. Although URL links to each video were all available between the date of extraction (17 November) and the coding period (17–19 November), a small

number of videos were unavailable in January of 2021 when calculating the  $\kappa$  coefficients.

An interpretative video content analysis adhered to ethical regulations that protect users' privacy. All data were publicly accessible on TikTok and ethical clearance was obtained from the Office of Research Ethics at The University of Queensland (exemption ref: 20200011080). Videos were streamed only through publicly available URLs and no media content was locally downloaded, copied or modified.

### RESULTS

The seven themes from the final sample of 808 vaping-related videos were: (i) *comedy and joke*, (ii) *lifestyle and acceptability*, (iii) *marketing*, (iv) *nicotine and addiction*, (v) *vaping tricks*, (vi) *creativity and tips* and (vii) *warning*. Videos categorised as 'comedy and joke' were most common (421/808; 52%), followed by 'lifestyle and acceptability' (282/808; 34.9%), 'marketing' (230/808; 28.5%), 'vaping tricks' (160/808; 19.8%), 'nicotine and addiction' (159/808; 19.7%), 'creativity and tips' (130/808; 16.1%) and 'warning' (86/808; 10.6%) (table 1).

Collectively, these videos were viewed over 1.5 billion times, with a median 'view' count of 1 000 000 (range 112 900–78 600 000) and a median 'likes' count of 143 000 (range 10 000–1 000 000). The majority portrayed e-cigarette use *positively* (512/808; 63.4%—viewed over 1.1 billion times). *Neutral* depictions of e-cigarette use were viewed a total of 290 million times (191/808; 23.6%) and *negative* portrayals of e-cigarettes were viewed a total of 193 million times (105/808; 13%). The people in the videos were perceived to be 71% male and 26% appeared to be <18 years old.

## DISCUSSION

This study systematically examined how e-cigarettes were portrayed on TikTok. Our analysis identified seven themes; comedy and joke, lifestyle and acceptability, marketing, nicotine and addiction, vaping tricks, creativity and tips, and warning. Similar themes have been previously identified on other social media platforms.<sup>19 20</sup> The publicly available videos were not age-restricted.

Videos frequently portrayed vaping through the use of humour and comedy, with fun story times, parodies and pranks. This is consistent with a content analysis of TikTok videos, which found that ‘comedy’ was a prominent theme, suggesting that having fun was a core user motive.<sup>23</sup> Similar to a study of e-cigarette content on Instagram,<sup>20</sup> posts frequently made reference to the acceptability of vaping by using specific vaping community hashtags (eg, #juulgang, #vapenation, #vapelife). These communities are built on shared experiences of e-cigarette use. People who use e-cigarettes and identify with vaping-related groups were more likely to have negative attitudes towards quitting e-cigarettes, lower behavioural control, lower intent to quit e-cigarettes and lower cessation self-efficacy.<sup>24</sup>

Product promotion was commonly featured on the videos, but it is not possible to infer whether this is a sponsored activity. Videos referencing nicotine dependence, such as the ‘Nicotine Addiction Check’ meme, featured colour-coordinated rows of e-cigarettes accompanied with the statement “Ayo! Nicotine addiction check!” which could trivialise nicotine addiction.<sup>25</sup> One fifth of our sample were categorised as vape tricks. These tricks appear to be especially appealing to youth and have been identified as a reason for e-cigarette initiation in youth,<sup>26 27</sup> but not adults.<sup>28</sup> Lastly, the theme ‘creativity and tips’ comprised ‘how to’ tutorials with step-by-step instructions on rewicking coils with cotton to hiding vapes from authority figures. Warnings on the health effects of vaping to discourage initiation were less common in our sample of videos.

The use of comedy, lifestyle references, nicotine addiction references, vaping tricks and ‘how to’ tutorials may create social norms around vaping and increase its social acceptance. The recommendation algorithm means that the reach of videos on TikTok may be more substantial than that of other video-sharing platforms.<sup>12</sup>

A limitation of the study is that our sample did not capture videos that used emoticons or those that do not caption their postings with hashtags. Second, we excluded ‘#Immuneupvapedown’ from our search list which may bias results to include more positive valence posts and exclude negative valence posts. We did not believe that #Immuneupvapedown belonged in the top 10 most viewed hashtags list because its videos, which are part of a sponsored tobacco control campaign, are continuously looped, rather than intentionally viewed.<sup>29</sup> Thirdly, although the  $\kappa$  scores were acceptable, there may be potential bias towards coding a younger perceived age. Lastly, while the current study cannot determine the outcome of exposure to e-cigarette content, experimental and longitudinal data<sup>10 30</sup> suggest that viewing other young people, friends, acquaintances or influencers, vaping in fun and entertaining contexts, is likely to normalise e-cigarette use and make it a behaviour to emulate.

## CONCLUSIONS

Publicly available vaping-related content reaches millions of TikTok viewers. Comedy and lifestyle themes dominated these user-generated TikTok videos. While moderating content on social media can be challenging, given the high rates of youth

participation on TikTok, there is a case for strengthening the platform’s moderation and age access policies—for example, with a combination of artificial intelligence, human moderators and age-verification measures—which would work to proactively identify content that falls outside user guidelines.

## What this paper adds

- ⇒ TikTok is a video sharing platform popular among youth where entertaining videos of vaping and e-cigarette use are highly viewed with no age restrictions.
- ⇒ Previous studies have indicated that exposure to vaping-related content among youth is associated with e-cigarette use.
- ⇒ Considering vaping-related videos are widely accessible on TikTok, there is an urgent need to consider age restrictions to reduce youth uptake.

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**Contributors** TS, GC and CL conceptualised the study concept and design. TS and CL guided data extraction analysis and cleaned and analysed the data. TS, JC, CT, LD, BC collected and coded the data. All authors drafted and revised the paper. GC supervised the study.

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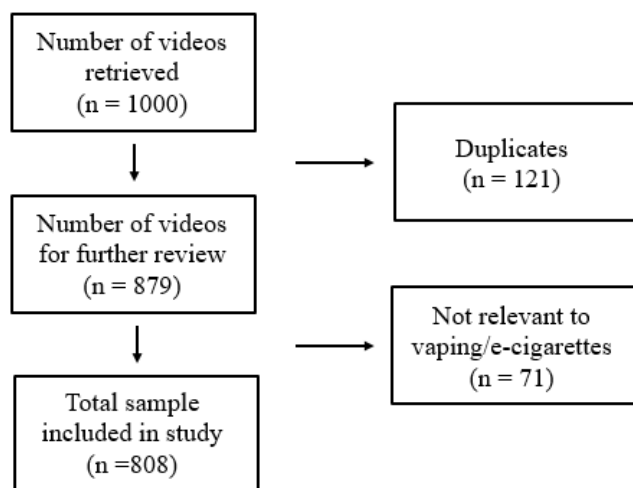
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## Supplementary



**Figure 1.** Flow diagram of the sampling strategy.

### Method 1. Development of codebook.

Two researchers (TS and CL) independently watched and performed in vivo coding on 50 videos. This involves coding the caption, audio and visuals in the videos to develop descriptive codes and definitions for the video themes. Researchers met to discuss and compare the coding and reconciled by combining or deleting where necessary. An additional 50 videos were coded using the refined codes. After reviewing 100 videos, a final codebook was developed where the codes for each theme were deemed to be operational with a clear and concise definition.

Vape related hashtags	Total Views in millions, searched on 17.11 <sup>1</sup>	%	Required number of URLs to extract from hashtag	Actual number of videos included in study
#Immuneupvapedown <sup>2</sup>	4400	-	-	-
#vape	2300	41.9	418	365
#vapetricks	880	16.2	162	120
#juulgang	588	9.9	99	54
#puffbar	350	6.2	62	62
#nicotine	331	5.8	58	58
#vapenation	330	5.7	57	42
#vaping	293	4.9	49	40
#vapeshop	317	5.3	53	44
#vapelife	243	4.2	42	23

**Table 1.** Top 9 vaping-related hashtags and their corresponding total views. A stratified random sampling method was used to select 1000 videos. Hashtags were ranked according to their number of views. Next, we calculated the proportion of viewed accounted for by each hashtag. The required number of URLs to extract was calculated by multiplying the proportion by 1000 (the predetermined sample size for this study).

<sup>1</sup>Metrics are rounded by TikTok.

<sup>2</sup>This hashtag was removed from our list of top viewed hashtags because we believe the 4.4 billion views for “#ImmuneUpVapeDown” do not reflect the true value of views since the same sponsored videos are continuously looped, rather than intentionally viewed.