




BMJ Open Presence of flavoured electronic nicotine delivery system (ENDS) products in US ENDS advertisements, 2015–2020: a content analysis

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ABSTRACT

Objectives Electronic nicotine delivery systems (ENDS) products come in a variety of flavours (eg, fruit, dessert, menthol). Tobacco advertising has historically used flavours as an advertising tactic, but little is known about flavour type and prevalence in ENDS advertisements. We assess the presence of flavoured ENDS in ads over time, by media outlet (eg, magazines, online) and brand.

Methods We acquired ENDS ads (N=4546) that first ran between 2015–2017 (n=1685; study 1) and 2018–2020 (n=2861; study 2) in outlets including opt-in emails, direct-to-consumer mail (study 1 only), video (TV and online), radio (study 2 only), static online/mobile (ie, ads without video or moving graphics), social media, outdoor (eg, billboards; study 2 only) and consumer magazines. We coded for presence of flavoured ENDS products and flavour type (eg, fruit, tobacco, menthol) and merged this information with metadata on ad year, outlet and manufacturer/retailer brand.

Results Overall, nearly half (45.5%; n=2067) of ads in our sample featured a flavoured product. Tobacco (59.1%; n=1221), menthol (42.9%; n=887) and fruit (38.6%; n=797) were the most advertised flavours. Over time, the proportion of ads containing tobacco-flavoured and menthol-flavoured ENDS generally decreased before menthol rebounded in 2020. The proportion of ads containing fruit, mint and dessert flavours generally increased over time, with a substantive drop in 2020. We found notable differences in flavoured ENDS advertising by outlet and brand.

Conclusions The overall presence of flavoured ENDS in our sample of ads remained relatively consistent, with tobacco flavour decreasing over time and some non-tobacco flavours increasing over time until 2020 when the presence decreased.

INTRODUCTION

Flavours are an important feature of electronic nicotine delivery systems (ENDS).^{1–3} While ENDS may assist in adult smoking cessation, the wide variety of flavours is cited as a common reason for ENDS use among both youth and adults.^{3–6} Youth ENDS use dramatically increased over the past decade, and in

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Strengths of this study include the large and longitudinal sample.
- ⇒ Findings from this study might help inform regulatory efforts related to flavoured electronic nicotine delivery systems (ENDS) marketing and highlight the need to continue monitoring trends in flavoured ENDS advertising.
- ⇒ Limitations include differences in procedure between study 1 and study 2.
- ⇒ Although the sample of ads analysed was large, it may not be fully representative of ENDS ad exposure across all US households.

2018 the US Surgeon General declared it an epidemic.^{7–9} Although current (use in the past 30 days) ENDS use among high school students recently declined to 11.3% in 2021, rates of flavoured ENDS use among youth who use ENDS remains high.^{9–11} In 2021, approximately 85% of high school students who were current ENDS users reported flavoured ENDS use in the past 30 days.¹²

Exposure to advertising may contribute to youth ENDS use.^{12–13} Advertising is used by the tobacco industry to communicate product benefits to consumers and encourages tobacco use.^{14–15} ENDS advertising can contribute to more favourable product perceptions and mislead consumers about risks.¹⁶ This is particularly troubling as 68% of US youth reported being exposed to ENDS advertising in 2020,¹⁷ and exposure to flavoured ENDS advertising is associated with greater interest in trying ENDS among youth.¹⁸

Studies suggest flavour is a common feature in ENDS ads across media outlets, including print, radio, online, social media, email and direct-to-consumer mail.^{19–22} The current study builds on that work and provides new insights into flavoured ENDS advertising by

investigating different characterising flavours featured in ENDS ads across 6 years (2015–2020), a time period that captures the substantial rise in youth ENDS use (2017–2019).⁸

METHODS

We purchased English-language US ENDS ads that ran from 2015 to 2017 (study 1, n=1685) and 2018–2020 (study 2, n=2861) from Numerator, a market research firm that monitors advertising. Ads included static text/images, video and/or audio copy, and were run in multiple channels including print (eg, magazines), radio, TV, online and direct mail/email. Metadata included the year that the ad first ran, advertising outlet and brand.

We coded study 1 and study 2 ads between 2020 and 2021 for presence of a flavoured product, which included tobacco flavour, explicit flavours (eg, fruit, menthol) and concept flavours (eg, 'winter solstice'). Eleven coders were trained through an iterative process of reviewing the codebook, applying it to exemplar ads, coding a batch of about 30 practice ads, assessing reliability and re-reviewing appropriate sections of the codebook when coding was not reliable; this process was repeated until coders were reliable on the full set of codes. We set an a priori reliability standard of 0.80; inter-rater reliability among the coders exceeded this standard. Seventy-five per cent of study 1 ads were coded independently; the remaining 25% were double coded to ensure reliability. All study 2 ads were double-coded. Any discrepancies were reconciled via review to achieve consensus. The coding instrument was developed based on review of prior literature and qualitative review of the ads. We classified the flavour type based on Krüsemann *et al*'s categorical 'flavour wheel'²³; however, we separated menthol and mint because they are discussed as separate categories in guidance for industry from the US Food and Drug Administration (FDA).²⁴ We additionally counted tobacco-flavoured products as flavoured. The coding instrument across studies was largely similar, with two exceptions. In study 1, coders could indicate whether a product contained multiple flavours (eg, 'chocolate martini' could be coded as candy *and* alcohol); 113 study 1 ads included products with multiple flavours. In study 2, coders selected a single flavour (eg, 'chocolate martini' would be coded as alcohol). In study 2, coders were also allowed to look up information on a product to confirm coding. Because of these differences, we do not make inferences about time trends between study 1 and study 2.

We used descriptive statistics to characterise the overall sample and analyse the prevalence of each type of flavour advertised by year, advertising outlet, and brand, and χ^2 tests to analyse differences in presence of flavour across study year.

Patient and public involvement

None.

RESULTS

Online supplementary table S1 presents the proportion of ENDS ads featuring flavoured products. Nearly half (45.5%) of all ads featured any flavoured product (including tobacco flavour) and around one-third (38.1%) featured a non-tobacco flavoured product. Ads that did not feature flavoured products typically did not feature any product at all (eg, an online ad that displayed only a brand name with no product featured), or displayed a device with no corresponding language or imagery to indicate presence of a flavoured liquid. Among ads with any flavoured ENDS, the most advertised flavours were tobacco (59.1%), menthol (42.9%) and fruit (38.6%). The least advertised flavours were nuts (0.1%), alcohol (2.2%), and spice (5.9%).

By year (table 1), the proportion of ENDS ads featuring any flavoured product ranged from 54.4% in 2020 to 39.0% in 2019. The proportion of ENDS ads featuring any non-tobacco flavoured product ranged from 44.1% in 2018 to 33.2% in 2015. The proportion of flavoured ENDS ads with tobacco decreased from 2015 to 2017 (75.6%–50.2%) and remained relatively stable from 2018 to 2020 (56.9%–59.7%). The proportion of ads with menthol declined from 2015 to 2017 (56.2%–35.0%) but increased from 2018 to 2020 (33.9%–55.0%). Ads featuring several flavours decreased in prevalence from 2018 to 2020: fruit decreased from 46.1% to 32.1%, mint decreased from 18.3% to 6.8% and dessert decreased from 22.5% to 8.7%.

By advertising outlet (online supplementary table S1), most direct-to-consumer mail ads (89.3%, n=243) featured flavoured products; tobacco (96.3%), menthol (77.4%), mint (44.9%) and dessert (28.4%) were most frequently promoted in direct-to-consumer mail ads. Around half (51.1%) of opt-in email ads contained flavoured ENDS products; the most common flavours in opt-in email ads were tobacco (50.5%), fruit (46.7%) and menthol (42.7%), followed by dessert (23.0%) and candy (21.2%). Approximately half of online/television video (47.1%) and consumer magazine (42.1%) ads and one-third of static online/mobile (38.9%) and social media (36.0%) ads promoted flavoured ENDS products. Across these four outlets, tobacco and menthol were most commonly featured; fruit flavour was also common in video, online/mobile and social media ads. A smaller proportion of radio (17.2%) and outdoor (13.9%) ads featured any flavoured ENDS products.

By brand, Vapor4Life and South Beach Smoke featured the widest range of flavoured products in their ads; across ads for each of these two brands, 11 of the 12 flavour categories that we coded for were represented. Most flavoured ENDS ads for MarkTen, NJOY, Logic and Vuse featured tobacco (range: 78%–95%) and menthol (range: 51%–63%) products. Approximately three-quarters of Blu flavoured ENDS ads featured tobacco (76.8%), but a smaller portion featured menthol (28.2%). Over half of flavoured ENDS ads for NJOY (56.4%) and JUUL (57.3%) featured fruit flavours, and approximately half

Table 1 Presence of flavoured products overall and by flavour type in ENDS ads by year (2015–2020)

	Study 1				Study 2			
	2015	2016	2017	P value	2018	2019	2020	P value
	(n=587 ads) % (95% CI)	(n=603 ads) % (95% CI)	(n=495 ads) % (95% CI)		(n=827 ads) % (95% CI)	(n=1359 ads) % (95% CI)	(n=675 ads) % (95% CI)	
Any flavoured product present*	41.2 (37.3 to 45.3) (n=242 ads)	41.6 (37.8 to 45.6) (n=251 ads)	48.7 (44.3 to 53.1) (n=241 ads)	p=0.023	52.7 (49.3 to 56.1) (n=436 ads)	39.0 (36.4 to 41.6) (n=530 ads)	54.4 (50.1 to 58.1) (n=367 ads)	p<0.001
Any non-tobacco flavoured product present	33.2 (29.5 to 37.1) (n=195 ads)	35.3 (31.6 to 39.2) (n=213 ads)	42.5 (38.2 to 46.9) (n=210 ads)	p=0.005	44.1 (40.8 to 47.5) (n=365 ads)	33.4 (30.9 to 36.0) (n=454 ads)	43.7 (40.0 to 47.5) (n=295 ads)	p<0.001
Flavoured product type†‡								
Tobacco	75.6 (69.8 to 80.6) (n=183 ads)	61.0 (54.8 to 66.8) (n=153 ads)	50.2 (43.9 to 56.5) (n=121 ads)	p<0.001	56.9 (52.2 to 61.5) (n=248 ads)	56.0 (51.8 to 60.2) (n=297 ads)	59.7 (54.6 to 64.6) (n=219 ads)	p=0.543
Menthol	56.2 (49.9 to 62.3) (n=136 ads)	43.0 (37 to 49.2) (n=108 ads)	35.7 (29.9 to 41.9) (n=86 ads)	p<0.001	33.9 (29.6 to 38.5) (n=148 ads)	39.1 (35 to 43.3) (n=207 ads)	55.0 (49.9 to 60.1) (n=202 ads)	p<0.001
Fruit	26.4 (21.3 to 32.4) (n=64 ads)	29.5 (24.2 to 35.4) (n=74 ads)	28.2 (22.9 to 34.2) (n=68 ads)	p=0.753	46.1 (41.5 to 50.8) (n=201 ads)	51.3 (47.1 to 55.6) (n=272 ads)	32.1 (27.6 to 37.1) (n=118 ads)	p<0.001
Mint	6.2 (3.8 to 10.0) (n=15 ads)	27.1 (22 to 32.9) (n=68 ads)	28.6 (23.3 to 34.7) (n=69 ads)	p<0.001	18.3 (15 to 22.3) (n=80 ads)	33.8 (29.9 to 37.9) (n=179 ads)	6.8 (4.6 to 9.9) (n=25 ads)	p<0.001
Dessert	7.8 (5.1 to 12.0) (n=19 ads)	29.5 (24.2 to 35.4) (n=74 ads)	38.2 (32.3 to 44.5) (n=92 ads)	p<0.001	22.5 (18.8 to 26.6) (n=98 ads)	18.3 (15.2 to 21.8) (n=97 ads)	8.7 (6.2 to 12.1) (n=32 ads)	p<0.001
Candy	0.0 (–) (n=0 ads)	2.0 (0.8 to 4.7) (n=5 ads)	10.0 (6.8 to 14.4) (n=24 ads)	p<0.001	17.2 (13.9 to 21.0) (n=75 ads)	12.4 (9.9 to 15.5) (n=66 ads)	20.7 (16.9 to 25.2) (n=76 ads)	p=0.004
Non-alcoholic beverages	0.8 (0.2 to 3.2) (n=2 ads)	2.8 (1.3 to 5.7) (n=7 ads)	5.4 (3.2 to 9.1) (n=13 ads)	p=0.013	13.5 (10.6 to 17.1) (n=59 ads)	10.6 (8.2 to 13.5) (n=56 ads)	12.0 (9 to 15.7) (n=44 ads)	p=0.367
Coffee	4.1 (2.2 to 7.5) (n=10 ads)	3.6 (1.9 to 6.7) (n=9 ads)	1.7 (0.6 to 4.3) (n=4 ads)	p=0.261	12.6 (9.8 to 16.1) (n=55 ads)	8.3 (6.2 to 11.0) (n=44 ads)	8.4 (6 to 11.8) (n=31 ads)	p=0.049
Spice	9.9 (6.7 to 14.4) (n=24 ads)	22.3 (17.6 to 27.9) (n=56 ads)	7.9 (5.1 to 12.0) (n=19 ads)	p<0.001	3.7 (2.3 to 5.9) (n=16 ads)	0.9 (0.4 to 2.2) (n=5 ads)	0.8 (0.3 to 2.5) (n=3 ads)	p=0.002
Alcohol	5.0 (2.8 to 8.5) (n=12 ads)	1.6 (0.6 to 4.2) (n=4 ads)	0.8 (0.2 to 3.3) (n=2 ads)	p=0.008	3.0 (1.7 to 5.1) (n=13 ads)	2.3 (1.3 to 3.9) (n=12 ads)	0.8 (0.3 to 2.5) (n=3 ads)	p=0.098
Nuts	0.0 (–) (n=0 ads)	0.8 (0.2 to 3.1) (n=2 ads)	0.0 (–) (n=0 ads)	p=0.145	0.0 (–) (n=0 ads)	0.0 (–) (n=0 ads)	0.0 (–) (n=0 ads)	–
Other§	14.0 (10.2 to 19) (n=34 ads)	29.9 (24.5 to 35.8) (n=75 ads)	50.6 (44.3 to 56.9) (n=122 ads)	p<0.001	20.9 (17.3 to 24.9) (n=91 ads)	18.3 (15.2 to 21.8) (n=97 ads)	10.1 (7.4 to 13.6) (n=37 ads)	p<0.001

*Includes tobacco-flavoured ENDS products.

†Denominator based on number of ads that advertised at least one flavoured ENDS product.

‡Flavoured product type categories were not mutually exclusive (ie, more than one flavour could be present in an ad). Because of this, percentages may sum to >100%.

§Other flavour category includes 16 flavours that did not fall into the other main categories (eg, nacho cheese) and 440 'concept flavours' where the flavour was unclear based on the name (eg, Winter Solstice, Red Venom, Pluto).

ENDS, electronic nicotine delivery systems.

of JUUL (45.6%) and MarkTen (44.4%) ads featured mint-flavoured products. Fruit flavour was less frequently promoted in MarkTen, Logic, Blu and Vuse flavoured ENDS ads (range: 11%–32%); mint flavour was less frequently promoted in NJOY, Logic, Blu and Vuse ads (range: 0%–25%).

DISCUSSION

Slightly less than half (45%) of the ENDS ads in our sample explicitly mentioned flavoured products, including tobacco flavour. The proportion of ads that promoted flavoured ENDS was high in all years. In addition, there was a general increase in the number of ads that featured non-tobacco flavoured ENDS products with the exception of 2019, where the proportion of ads promoting non-tobacco flavoured ENDS in 2019 was lower than in 2018 or 2020. This may reflect a short-term change in marketing strategy or, perhaps, reflect industry response to the 2019 announcement proposing a change in FDA's compliance policy with respect to flavoured ENDS products (other than tobacco, mint and menthol flavours).²⁵ Overall, the rates reported in this study are similar to those reported in previous analyses of flavoured ENDS advertising.^{19 20 22} Collectively, these studies draw attention to the persistent use of flavour as a marketing tactic in ENDS advertising.

Our study highlights which flavoured ENDS most frequently appeared in ads from 2015 to 2020. The most advertised flavours in our sample were tobacco and menthol. However, the proportion of study ads that included fruit, mint and dessert—the three flavours most commonly used by adolescents¹⁰—was notable. Approximately half of the study ads that ran in 2017, 2018 and 2019 contained at least one of these other flavours, surpassing the proportion of ads promoting flavours available in cigarettes such as tobacco (2017) or menthol (2017–2019) flavoured products. The rate of youth ENDS use was also at its highest in 2018 and 2019.^{7 10 11} Given the role advertising can play in youth initiation of tobacco products^{13–15} and youth appeal of flavours,^{1–3 5 10} it is important to understand the flavour information conveyed in ENDS advertising during this time period.

The proportion of ads in our sample advertising fruit, mint or dessert flavours decreased in 2020 compared with 2018 and 2019, while the proportion advertising menthol flavour increased. This may reflect an industry response to guidance released by FDA in January 2020 to restrict the sale of flavoured cartridge-based ENDS, excluding tobacco and menthol flavour.²⁴ Retail market data suggests that menthol-flavoured ENDS sales increased following this guidance while sales of other characterising flavours (eg, mint, fruit) decreased.²⁶ It is possible that advertising also focused more heavily on promoting menthol during this time, further reflecting dynamic changes to flavour marketing strategy that may occur alongside regulatory actions.

Finally, our study identifies trends in flavoured ENDS advertising across different media outlets and brands. We

found that a substantial proportion of opt-in email, direct-to-consumer mail and video ads in this sample contained flavoured ENDS products, particularly tobacco, menthol, fruit, mint and dessert flavours. A noteworthy proportion of opt-in emails also included candy and non-alcoholic beverage flavoured products. Direct-to-consumer marketing is often out of public view,²⁷ and an important source of marketing exposure, especially among young people.^{28–30} These findings shed light on the extent to which consumers, including youth, might be exposed to a range of flavoured ENDS marketing from both manufacturers and retailers.

Limitations

Due to the difference in flavour coding and ad channels in the samples between study 1 and study 2, trends in the presence of flavour in ads between those two time periods should be interpreted with caution. For example, direct-to-consumer ads were only analysed in study 1, while radio ads were only analysed in study 2. There may be additional changes in the tobacco marketing landscape that occurred during this time that are not reflected in the current analyses that present data for the whole time period of the study (eg, Juul stopping sale of flavoured pods other than tobacco and menthol). In addition, all opt-in email, direct-to-consumer mail and social media marketing provided through Numerator is based on a national panel and may not be fully representative of ENDS ad exposure across all US households. We additionally did not collect data on other features such as product price or device generation or type; future research could examine difference in flavour presence by these features. Finally, we report frequencies and do not account for the relative volume of consumer exposure to flavoured ENDS ads.

CONCLUSION

Results from this study highlight the prominence of flavours in ENDS advertising. Both traditional flavours, like tobacco and menthol, as well as fruit, mint and dessert flavours were consistently marketed in the ads included in this study time-frame (2015–2020). Findings suggest a continued need to monitor trends in flavoured ENDS advertising.

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