

Menthol e-cigarette sales rise following 2020 FDA guidance

Megan C Diaz, Emily M Donovan , Barbara A Schillo, Donna Vallone 

Schroeder Institute, Truth Initiative, Washington, DC, USA

Correspondence to

Emily M Donovan, Schroeder Institute, Truth Initiative, Washington, DC 20001, USA; edonovan@truthinitiative.org

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ABSTRACT

Objective To explore patterns in flavoured e-cigarette sales following Juul Labs' 2019 removal of mint-flavoured products and the Food and Drug Administration's (FDA) 2020 e-cigarette flavour guidance which prohibits flavoured cartridge-based sales, but allows for the sale of tobacco-flavoured and menthol-flavoured cartridges, open-system and disposable e-cigarettes.

Methods We examined Nielsen Retail Scanner data from September 2013 to March 2020. Inflation-adjusted sales dollars for e-liquid-containing products were classified into five flavour categories (fruit, menthol, mint, tobacco and other).

Results Following the Juul Labs 2019 and FDA 2020 actions, total e-cigarette sales declined; however, menthol-flavoured e-cigarette sales dollars increased, while mint-flavoured e-cigarette sales dollars decreased in both instances. Juul Labs' removal of mint-flavoured products was followed by a 59.4% increase in the market share of menthol-flavoured e-cigarettes over 4 weeks. The FDA's 2020 guidance was followed by a 42.7% increase in the market share of menthol-flavoured e-cigarettes over 4 weeks and a 104.9% increase over 8 weeks.

Conclusions Juul Labs' self-regulation and the current FDA flavour guidance were followed by a shift towards menthol-flavoured e-cigarettes. Industry self-regulation and current federal guidance appear insufficient in reversing the youth vaping epidemic. E-cigarettes must be fully regulated as a tobacco product including the removal of flavoured e-cigarettes, including menthol, from the market to reduce youth e-cigarette use.

INTRODUCTION

E-cigarette use among US youth has surged in recent years, with 27.5% of US high school students reporting past 30-day e-cigarette use in 2019.¹ Adult use, in contrast, has remained relatively low with 3%–4% of adults reporting past 30-day e-cigarette use from 2014 to 2018.²

Youth are more likely to initiate tobacco use—including vaping—using flavoured products,³ and the dramatic increase in youth initiation of e-cigarettes has been associated with appealing sweet and fruity flavours that have dominated the market.^{1,4} As evidence grows regarding the inherent risks of youth e-cigarette use,⁵ over 274 jurisdictions across the USA have taken action to reduce youth access to flavoured tobacco products (including flavoured e-cigarettes) by enacting flavoured tobacco sales restrictions. In 2019 alone, 85 of such policies were adopted across the nation.⁶

In late 2018, Juul Labs (Juul) removed all flavoured e-cigarettes—except for mint, menthol and tobacco—from retail stores but these products remained available for sale through online retailers. Following this action, mint-flavoured e-cigarettes quickly became the most popular flavour used among US high school students,⁷ and sales of non-Juul fruit-flavoured e-cigarettes rapidly increased.⁴ These swift market shifts demonstrate that without a comprehensive e-cigarette flavour ban, consumers are likely to switch to other flavoured products that remain on the market. There have been more recent actions on flavoured e-cigarettes, including the removal of mint-flavoured pods by Juul in late 2019 and flavoured e-cigarette guidance released by the Food and Drug Administration (FDA) in 2020, which prohibits flavoured cartridge-based e-cigarette sales, but allows for the sale of tobacco-flavoured and menthol-flavoured cartridges, open-system and disposable e-cigarettes.^{8,9} Therefore, many flavoured e-cigarettes remain on the market in the form of menthol-flavoured cartridge-based e-cigarettes and flavoured disposable and open-system e-cigarettes.

Little is known about consumer response to the most recent 2019 action taken by Juul and the 2020 FDA guidelines. Using scanner data, this study describes sales patterns related to the evolving flavoured e-cigarette market to help illustrate the limited effects of recent efforts to reduce youth e-cigarette use.

METHODS AND DATA SOURCE

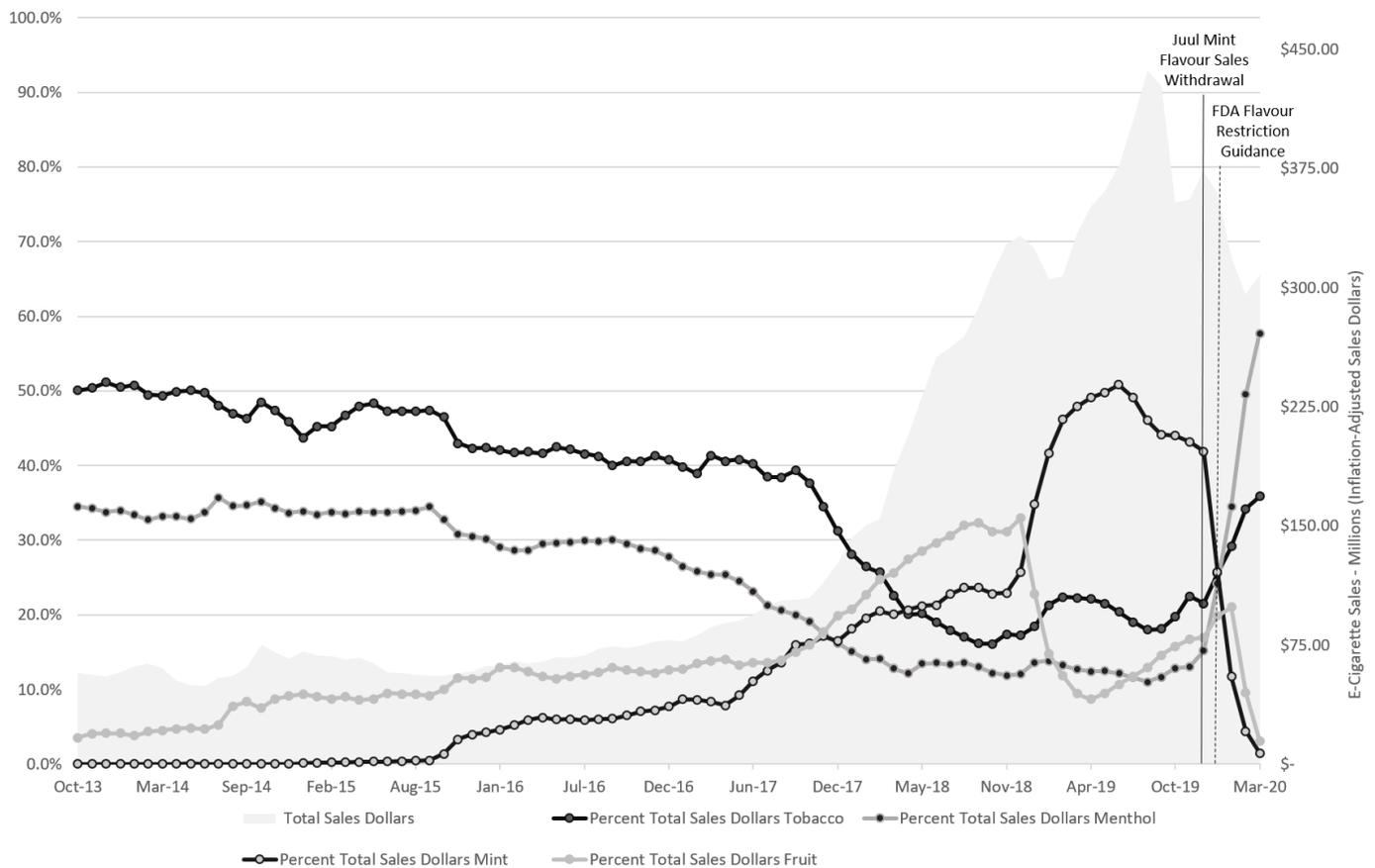
We analysed Nielsen Retail Scanner data from September 2013 through March 2020 which include universal product code-level sales dollars aggregated to 4-week totals at the national level. Retail data reflect sales from: (1) participating independent, chain and gas station convenience stores; (2) food, drug and mass merchandisers; (3) discount and dollar stores; and (4) military commissaries.

Sales data were aggregated across five flavour categories: fruit, mint, tobacco and other (desserts, coffee and alcoholic beverages) for each 4-week period provided by Nielsen. We excluded all e-cigarette products that did not contain e-liquids, such as batteries, accessories and starter kits with no refills, from the analysis. Two independent analysts coded the flavour names in the data set. Differences were reconciled by searching brand names online for flavour descriptions (3.7%). Concept flavours (11.0%)—defined as those where it is difficult to discern a distinct flavour, such as 'Jazz' and 'Neon'—were also searched online by brand name and back coded into one of the flavour



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Notes: 1) Market share for "Other" flavours has been removed from graph. 2) Sales dollars figures exclude products that do not contain e-liquids. 3) Each dot in the figure represents a four-week period

Figure 1 E-cigarette sales from October 2013 to March 2020 by flavour category. Notes: (1) Market share for 'other' flavours has been removed from the graph. (2) Sales dollar figures exclude products that do not contain e-liquids. (3) Each dot in the figure represents a 4-week period. FDA, Food and Drug Administration.

categories. All sales totals are inflation adjusted to March 2020 dollars and reported as proportions.

We present the data as proportions of total sales dollars for each flavour category. In addition, we also present flavour proportions for Juul, Juul-like and other e-liquid-containing products. We define Juul-like products as products that also resemble USB devices and are referred to as pod mod devices. Examples of all other products would be tanks, e-liquids and cigarette-like devices.

RESULTS

From 2013 to 2015, the proportions of sales of tobacco-flavoured (42%–51%), menthol-flavoured (30%–36%) and mint-flavoured (<4%) e-cigarettes remained relatively constant (figure 1). Starting in October 2015, sales of mint-flavoured e-cigarette products steadily increased to a peak of 50.8% market share in June 2019, while the sales proportion of tobacco-flavoured and menthol-flavoured products declined. The tobacco-flavoured e-cigarette market share declined to its lowest level in October 2018 (16.1%) and the menthol-flavoured e-cigarette market share declined to its lowest in August 2019 (11.0%). The e-cigarette market itself reached an inflation-adjusted sales peak of \$436 million per 4-week period in August 2019.

Following Juul's November 2018 removal of fruit-flavoured and sweet-flavoured products from retail stores, sales of mint-flavoured e-cigarettes increased to 50.8% of the market share by June 2019 while sales of fruit-flavoured products declined.

At this time, Juul mint-flavoured and Juul fruit-flavoured sales captured 49.2% and less than 1% market share, respectively; Juul-like and other e-cigarette products doubled their market share of fruit-flavoured products from 5% to 10%. As sales of fruit-flavoured Juul-like e-cigarettes continued to increase, mint-flavoured e-cigarette sales slowly declined from June to November 2019, which coincides with Juul's announcement that it would remove mint-flavoured products from both retail and online sales outlets. After this announcement, the market share of mint-flavoured products decreased by 38.5%, driven predominantly by a decrease in Juul mint-flavoured products; while the market share of menthol-flavoured products increased by 59.4% in the first 4-week period (1 December 2019 to 28 December 2019). For this 4-week period Juul made up approximately 66% of the menthol-flavoured market. Further, while total e-cigarette sales declined by \$13.5 million, menthol e-cigarette sales dollars increased by \$30.4 million and mint e-cigarette sales dollars decreased by \$60.7 million.

The decline in mint product sales and the concurrent increase in menthol-flavoured e-cigarette sales continued for the next 8 weeks (29 December 2019 to 23 February 2020), which follows the FDA's guidance around the removal of non-menthol-flavoured cartridge-based e-cigarettes in January 2020. In the first 4-week period (29 December 2019 to 25 January 2020), the market share of mint products declined by 54.4% and the market share of menthol products increased by 42.7%. During this 4-week period, total e-cigarette sales declined by \$41.5

million, with mint e-cigarette sales declining by \$55.2 million and menthol e-cigarette sales increasing by \$22.8 million. Over 8 weeks (29 December 2019 to 23 February 2020), the market share of mint and menthol had decreased by 82.8% and increased by 104.9%, respectively. During this 8-week period, total e-cigarette sales declined by \$64.0 million, with mint e-cigarette sales declining by \$79.5 million and menthol e-cigarette sales increasing by \$59.5 million. By March 2020, menthol-flavoured e-cigarette sales had risen to an all-time high of 57.7% market share. As of March 2020, Juul makes up approximately 60% of the menthol-flavoured market and 53% of the tobacco-flavoured market.

DISCUSSION

Results from this study suggest that, when non-menthol e-cigarettes are removed from the market, sales will transition to menthol e-cigarettes. Although the e-cigarette market overall has contracted somewhat since September 2019, following the outbreak in e-cigarette or vaping product use-associated lung injury (EVALI),¹⁰ the data illustrate that Juul and FDA actions were followed by a notable shift towards menthol-flavoured e-cigarette sales. These findings, along with prior research,^{4 11 12} demonstrate consumer willingness to switch flavours based on product availability.

These data reinforce that both industry self-regulation and partial flavour restrictions are not sufficient; Juul's removal of mint-flavoured e-cigarettes was followed by sales shifting to menthol e-cigarettes, an observation similar to recent findings from Liber *et al*, showing that Juul's removal of sweet and fruit flavours was followed by the share of mint-flavoured and menthol-flavoured e-cigarettes doubling.⁴ Our findings also indicate that the current FDA guidance is inadequate, as sales have shifted from fruit-flavoured and mint-flavoured e-cigarettes to menthol-flavoured and tobacco-flavoured products. Despite the decades of evidence related to the role of menthol in facilitating the uptake of tobacco products, this flavour remains on the market for both cigarettes and e-cigarettes,³ and this study illustrates a willingness among e-cigarette consumers to shift to using this flavour.

Although this study has many strengths, it is not without limitations. While retail sales data are a good indicator of product use trends, switching patterns and aggregate consumer behaviour, data do not allow us to determine how product preferences shifted for consumers and more specifically for youth. However, given the much higher prevalence of youth e-cigarette use compared with adult e-cigarette use,^{1 2} youth use is likely reflected in these trends. Second, though early evidence has indicated that flavoured e-cigarette users may be switching to flavoured disposable and open-system products that remain on the market,¹² more data are needed to understand these trends. Additionally, Nielsen sales data do not include products sold online or in vape shops; therefore, the extent to which consumer behaviours changed in response to the voluntary change by Juul and the FDA guidance may not be fully portrayed. Finally, we did not test whether the observed changes in trends are directly associated with action taken on flavoured e-cigarettes by Juul and the FDA, nor did we control for the effects of EVALI or the federal Tobacco 21 law.^{10 13} However, given that EVALI and Tobacco 21 largely did not affect availability of specific e-cigarette flavours at the national level, our results are suggestive of an association between Juul and FDA actions on flavoured e-cigarettes and the changes in the market composition of e-cigarette flavours.

The lack of comprehensive e-cigarette restrictions continues to put the health of America's young people at risk. In light of high youth vaping rates and mounting concerns that smoking and vaping may increase risk of severe complications from COVID-19, comprehensive FDA regulation of e-cigarettes remains as critical as ever.¹⁴

What this paper adds

What is already known on this subject

- ▶ Flavoured e-cigarettes, including menthol, play a significant role in youth e-cigarette initiation.
- ▶ Research demonstrates that partial flavour restrictions may result in consumers switching to unrestricted flavours.

What important gaps in knowledge exist on this topic

- ▶ Peer-reviewed flavoured e-cigarette sales trends have not been investigated following Juul Labs' removal of mint pods and the Food and Drug Administration (FDA) 2020 flavour guidance which prohibits flavoured cartridge-based sales, but allows for the sale of tobacco-flavoured and menthol-flavoured cartridges, open-system and disposable e-cigarettes.

What this paper adds

- ▶ Juul Labs' removal of mint e-cigarettes and the current FDA e-cigarette flavour guidance were followed by a shift in e-cigarette sales from mint e-cigarettes to menthol e-cigarettes.

Twitter Megan C Diaz @MeganCDiaz

Contributors MCD supervised the data coding process and conducted the analyses. ED, BS and MCD drafted the manuscript. All authors collaborated on the interpretation of findings and placement in context, were involved in the conceptualisation of the study and design of analyses and were responsible for review and refinement of the manuscript's content.

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ORCID iDs

Emily M Donovan <http://orcid.org/0000-0002-7935-1131>

Donna Vallone <http://orcid.org/0000-0001-9841-9333>

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