


Youth access to JUUL online: eBay sales of JUUL prior to and following FDA action

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ABSTRACT

Background The novel e-cigarette product JUUL has experienced rapid market growth. The online auction site eBay has been mentioned as a source of JUUL access for youth, and the US Food and Drug Administration (FDA) notified eBay to remove JUUL listings in April 2018. We sought to characterise the sale of JUUL products on eBay prior to the FDA's request, document the impact of this request and explore ways in which eBay vendors bypassed this effort.

Methods eBay was searched for JUUL-branded products sold by US vendors in March 2018, yielding a sample of 197 listings for devices and/or pods. Each listing was coded for product, listing and youth access content. Following FDA action, each listing was revisited to determine its status, and each vendor's page was searched for JUUL and other vaping content. Data were analysed using descriptive statistics.

Results Of 197 eBay listings, 189 were for JUUL kits and 13 were for pods. Prices were on average higher than those on the official JUUL store, and language about age restrictions was rare. Following FDA contact, most listings were no longer active. However, 3.4% of these vendors still sold JUUL devices or pods and 15.5% were selling other vaporisers or nicotine products.

Conclusions Online platforms may lack the will or expertise to effectively monitor content for tobacco products, while vendors quickly adapt to minor changes with simple strategies such as spelling variations. Accurate identification of online e-cigarette vendors is essential to the enforcement of policy and may benefit from cross-sector partnerships.

INTRODUCTION

The novel electronic cigarette ('e-cigarette') product JUUL has experienced rapid market growth since its introduction to US consumers in 2015. As of March 2018, JUUL held a 54.6% market share for e-cigarettes.¹ JUUL devices resemble flash drives and are designed for use with JUUL pods, which contain 0.7 mL by volume/5% nicotine by weight and come in eight flavour varieties. By comparison, blu e-cigarette 'liquidpods' are offered in a range of nicotine levels spanning from 0% to 4%.² JUUL starter kits come with a mixed flavour package of Virginia tobacco, cool mint, fruit medley and crème brûlée pods, although JUUL recently changed these names to mint, fruit, and creme and also added a 3% nicotine level for select flavors. JUUL devices can also be accessorised with decorative wraps/decals. In addition to being popular among adult users, JUUL appears to have become extremely popular with youth. Anecdotal evidence suggests widespread usage in schools.³ An initial Truth Initiative survey

using a convenience sample drawn in November 2017 found that 7% of youth aged 15–17 years have used JUUL devices.⁴ While there are no current data on the proportion of current e-cigarette users who use JUUL, the number suggests that a sizeable proportion of the overall 11.7% of high school students who use e-cigarettes may be using JUUL devices.⁵

While it is still unclear where youth obtain JUUL devices and pods online, the online auction site eBay has been mentioned as a source of JUUL access for youth.³ The importance of eBay as a source of JUULs was highlighted by the US Food and Drug Administration's (FDA) Youth Tobacco Prevention Plan actions announced on 24 April 2018, which included contacting eBay about multiple JUUL listings on the platform. While eBay had already formally banned listings for all 'electronic cigarettes and components as defined under FDA regulations' in its terms of service policy,⁶ the FDA reported that it was thankful that the site had now removed the listings in question and implemented 'new measures to prevent new listings from being posted...'.⁷

Despite recent FDA and eBay actions, there has been no empirical evidence on JUUL sales on eBay. Online surveillance of JUUL is critical to informing future regulatory actions, particularly in light of evidence that tobacco brands and retailers often fail to comply with both their own terms of service policies and federal policies that prohibit tobacco promotions or require age verification.^{8–10} The goals of this study are to: (1) characterise the sale of JUUL devices and pods on eBay prior to the FDA's request to remove listings in April 2018, and (2) document the impact of the FDA action and the ways in which eBay vendors work to bypass efforts to limit JUUL sales.

METHODS

Initial data collection

Using eBay's search engine, we conducted a search for 'JUUL' listings made by US-based vendors on 28 March 2018. We further restricted the search to only those listings that eBay vendors classified as having the brand 'JUUL'. This yielded a list of 350 unique listings, all of which sold some form of JUUL or e-cigarette-related product. Each listing was saved as a PDF to create a static record. At this stage, two listings had been deleted, either by vendors or eBay, and were removed from the sample. The sample then included 348 JUUL listings, with listings serving as the unit of analysis to determine details regarding products and sales strategies. Of these listings, 96 were for wraps/decals, 46 were for JUUL chargers and 9 were for other brands of devices (most commonly BO Vape



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(n=6) and Coco Pods (n=3)). These non-JUUL device or pod listings were not included for further analysis, resulting in a final sample of 197 listings. Since listings often last for several weeks, a snapshot approach was determined to be appropriate to avoid capturing the same listings at multiple time periods. Additionally, eBay removed the JUUL brand search option following FDA contact in April, making it impossible to exactly replicate the search.

Coding and analysis

A codebook was developed to document: (1) vendor usernames and locations, (2) products sold (basic JUUL device kits with no pods, JUUL starter kits with pods, JUUL pods, JUUL wraps/decals, JUUL chargers or non-JUUL devices), (3) item list prices, free shipping offers and sales types (auctions, buy now or best offer), (4) number of completed sales from the listing (when available), (5) any language about age restrictions, age verification or discreet shipping, (6) JUUL pod flavours and mentions of nicotine content and (7) the date that the listing was most recently updated (when available). Flavour codes were not mutually exclusive, as listings frequently had multiple pod flavours included. When a listing sold multiple items, each item type was coded for that listing. The codebook was tested on a random sample of 20 listings by two researchers, with clarifications made as needed and an additional code added to document the sale of limited edition colours of JUUL devices. The final codebook was then independently applied by two researchers to a random sample of 40 listings (11.5%) to determine reliability. Statistical analysis showed the intercoder reliability measured by Cohen’s kappa statistics was high with an average of 0.97 with a range of 0.66–1.00. After discussion and resolution of coding discrepancies, the remainder of the listings were split between the two coders.

We performed descriptive analyses to assess code frequencies for JUUL devices and pods, respectively. Means, SD and ranges were reported for continuous variables, and percentages were calculated for categorical variables. For JUUL devices, we estimated the prices of basic (device only) and starter (device with pods) kits in both regular and limited editions. Listings for multiple devices and/or pod packages for purchase as a single unit were excluded from price data. Pod flavour and nicotine strength data were calculated based on both JUUL starter kit and pod listings. All the analyses were conducted using STATA V.14.

Follow-up data collection

After becoming informed of FDA’s notice to eBay and eBay’s action to remove and prevent JUUL listings on 24 April 2018, we revisited the link to each listing in the original sample on that day to determine if it was still active. Between 26 April and 28 April, we also visited the main sales page for each of the 148 individual vendors who sold JUUL devices or pods in the initial sample to search for the term ‘JUUL’ and code for: (1) if the vendor was still active, (2) if the vendor was still selling JUUL devices or pods and (3) any spelling variations of JUUL made in listing titles or related listing titles displayed on the same page. Additionally, we coded for if vendors were selling other e-cigarette or vaping devices, pods or e-liquids that would also be prohibited under eBay’s terms of service but subject to less immediate government scrutiny.

RESULTS

Of the 197 eBay listings for JUUL devices and pods, 189 were for basic and starter JUUL kits and 13 were for pods. Five of the

Table 1 Descriptive statistics of basic characteristics by type of product

	JUUL kits (N=189*)		JUUL pods (N=13*)	
	n	Mean (SD), %	n	Mean (SD), %
Number of sales†	99	52.8 (228.4) Range: 1–1844	8	21.9 (24.8) Range: 1–58
Number of days on eBay†	129	18.9 (23.7) Range: 0–132	9	19.8 (17.8) Range: 2–50
Price†	–	–	13	19.8 (5.6) Range: 16.0–36.0
Basic kit, regular	80	39.9 (8.9) Range: 17.5–73.0	–	–
Basic kit, limited edition	18	68.3 (16.8) Range: 42.0–110.0	–	–
Starter kit, regular	88	50.9 (8.6) Range: 30.0–80.0	–	–
Starter kit, limited edition	1	75.0 (–) Range: –	–	–
Age restriction				
Age 18 years	5	3.2	0	0.0
Age 21 years	6	2.7	1	7.7
Legal age	12	6.4	3	23.1
No age restriction identified	166	87.8	9	69.2
Shipping method				
Discreet shipping	15	7.9	0	0.0
Free shipping	121	64.0	13	100.0

*Five eBay listings included multiple product types.

†Sales, number of days on eBay and mean price are estimated using a partial sample due to missing values.

listings sold both JUUL pods and devices as separate purchase options. Table 1 summarises listing information by product type. Of listings, 57.9% were ‘buy-now’ for a fixed price, 4.1% were auctions and 38.1% were best offer. Additionally, all listing titles referred to JUULs by the official brand spelling. In total, 148 individual vendors were selling JUUL devices or pods. Vendors were all located in the USA and most commonly located in New York (n=22), California (n=18), Florida (n=16), Illinois (n=16) and New Jersey (n=11). Individual vendors had on average 1.3 listings in the sample, with the range being from 1 to 16. Over 80% of vendors had only one listing for JUUL devices/pods in the sample. However, listings often had multiple units of the item for sale. Among those listings that disclosed the number of items sold as of 28 March 2018 (52.4% and 61.5% of listings for JUUL kits and pods, respectively), a total of 5253 basic and starter JUUL kits and 175 packs of pods had been sold. Listings had been active (based on the date last updated) for on average 19 days. The longest that a device or pod listing had been active was 132 days.

Prices and items for sale

The average list prices for basic and starter kits in a regular edition were \$39.9 and \$50.9, compared with \$34.99 and \$49.99 on the official JUUL website.¹¹ Counterparts in limited edition colours had higher prices (\$68.3 and \$75.0). Notably, approximately one-third (31.3%) of JUUL basic kits and more than half (55.7%) of starter kits in a regular edition had a lower list price than that on the official website. The average list price of a package of four JUUL pods was \$19.8, compared with \$15.99 on the official JUUL website.¹¹ All JUUL pod listings and 64% of device listings had free shipping. The JUUL pod flavours most commonly sold in listings that included pods (n=105) were

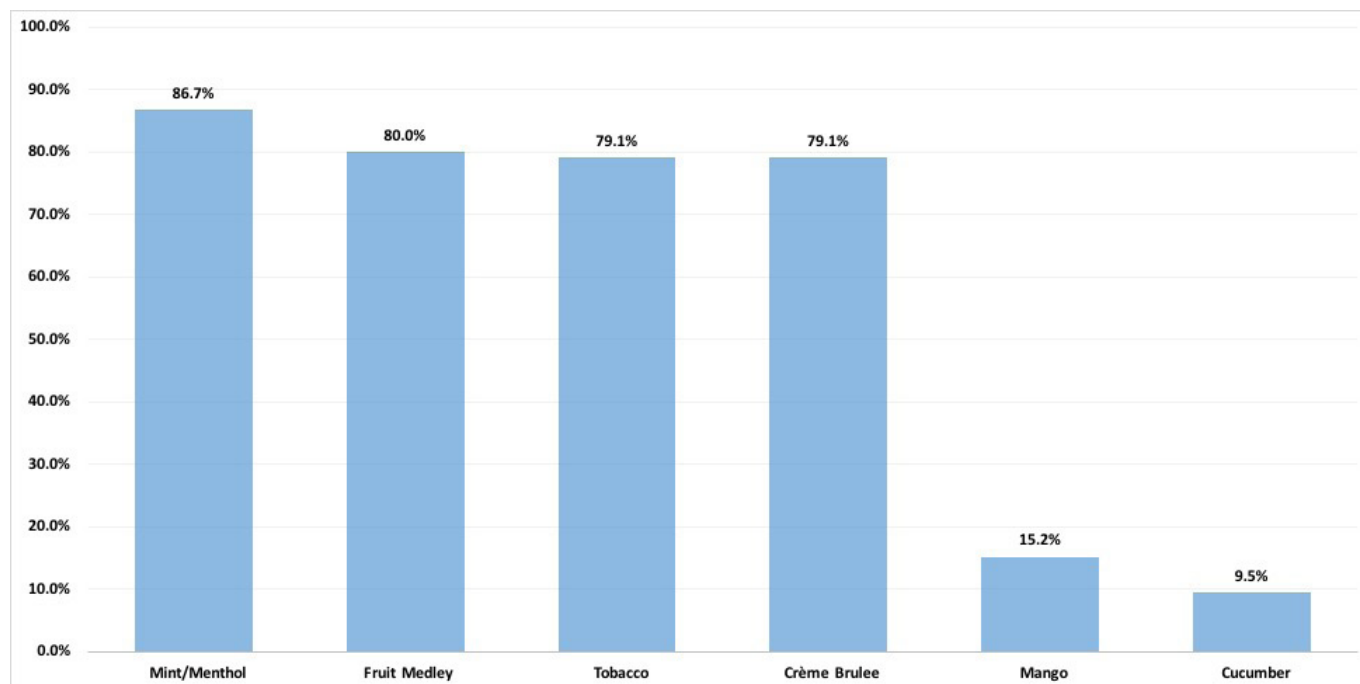


Figure 1 Flavours in eBay listings that include JUUL pods (n=105).

mint/menthol (86.7%), fruit medley (80.0%), tobacco (79.1%) and crème brulee (79.1%). These are the four flavour categories included in JUUL starter kits. Only 15.2% and 9.5% of listings with pods included mango or cucumber flavours (figure 1). Of listings that included pods, 14.3% mentioned pod nicotine content.

Youth access language

Of basic and starter JUUL kit listings, about 12% (n=23) included language about a minimum age for purchase, including ages 18 years, 21 years or the legal age in the buyer's state. However, almost no listings (n=2) discussed how age verification would be enforced on the platform. Rather, language was limited to statements such as 'Must be 18+' or 'Please be of legal age in your state to buy this product'. A similar pattern was also observed for JUUL pods, with 4 out of 13 listings mentioning an age restriction but none discussing verification. About 8% of JUUL device and starter kit listings (n=15) also mentioned that they would ship the product discreetly.

Post-FDA/eBay action listings

Following the FDA action, 100% (n=189) of the device listings and 92.3% of the pod listings (n=12) that were live on 28 March 2018 were no longer active. However, 52.7% (n=78) of the original device and pod vendors (n=148) still had some form of items for sale and 3.4% (n=5) of vendors still had listings with JUUL devices or pods for sale. In all cases vendors changed the spelling of JUUL in listing titles. However, these items were visible in search results for JUUL due to eBay's 'Result Matching Fewer Words' search algorithm. JUUL was still sometimes used in the description of items. For example, one vendor had listings for a JUULV3 device and JUUL pods, but mentioned in the body of the listing that the products were from 'JUUL Labs Inc.'. Other spelling variants in listing titles and the items that eBay's algorithm suggested as related items included J.U.U.L, JUUUL, JUUL2 and JUUULL (figure 2). Some listings had an image of JUULs but avoided any mention of a brand name in the

title, instead describing the product with language such as 'new authentic starter kit'. Notably, JUUL devices and pods, although with novel spellings, were still showing up as sponsored items (figure 2). Additionally, 15.5% (n=23) of vendors had listings for non-JUUL vaporisers and nicotine products that would also be prohibited under eBay's internal policies. This included JUUL-like pod-based devices such as BO Vape, Sourin and Phix.

DISCUSSION

Prior to the FDA notifying eBay about JUUL listings on its platform, eBay was home to a large number of JUUL listings. This is despite the fact that eBay's terms of service policy includes a blanket prohibition on e-cigarettes and their components. eBay's own sales data from listings indicate that it allowed thousands of illicit transactions for JUUL products. Because not all listings provided the number of units sold and JUULs have been available in the USA since 2015, this is likely a significant underestimate of the true number of transactions. The long time span that listings were left active provides further evidence that eBay was not effectively identifying JUUL listings to enforce its terms of service policies. This is consistent with Facebook's weak enforcement of its policies against tobacco sales and promotions,⁹ suggesting that online platforms may be lacking either the will or expertise to effectively monitor content for tobacco products. Prior research suggests that eBay has also struggled to prevent alcohol sales to minors.¹²

Although it is impossible to determine who was purchasing JUUL devices and pods via available data, the vast majority of listings did not specify a minimum age for purchase or indicate that age would be verified. Other studies have documented that age verification policies are rarely enforced by online e-cigarette and e-liquid vendors and that some use language stating that placing an order certifies the buyer as being of legal age.^{10 13 14} This approach cannot effectively verify age and is not recognised as a valid and enforceable means of preventing sales to minors.¹⁰ JUUL listings on eBay largely lack even this symbolic compliance with regulations against the sale of tobacco products to

NEW JUULV3-DEVICE + CHARGER (NO PODS)...100% AUTHENTIC...Fast Shipping..

11 viewed per hour

Condition: **New** [Add to watch list](#)

Quantity: More than 10 available / 9 sold

Price: **US \$38.95** **Buy It Now**

Add to cart

[Add to watch list](#)

30-day returns Located in United States 5 watchers

Seller information
 (57)
 98.3% Positive feedback

[Save this Seller](#)
[Contact seller](#)
[Visit store](#)
[See other items](#)

Shipping: **FAST 'N FREE**
 On or before **Wed. May. 02** to 53211
 Ships today if paid within **2 hrs 52 mins** [Details](#)
 Item location: Huntington, New York, United States
 Ships to: United States

Payments: **PayPal** | [See details](#)

Returns: 30 day returns. Buyer pays for return shipping | [See details](#)

Guarantee: [See details](#)
 Get the item you ordered or get your money back.
 Covers your purchase price and original shipping.

Have one to sell? **Sell now**

People who viewed this item also viewed 1/2

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<p>JUUL STARTER KIT</p> <p>INCLUDES: • JUUL DEVICE • USB CHARGER • RECHARGEABLE BATTERY</p> <p>SPONSORED NEW JUULV3-DEVICE + CHARGER + 4PK OF</p> <p>\$44.99 Free shipping</p>	<p>MYLE Device Kit</p> <p>SPONSORED</p> <p>\$29.99 Free shipping</p>	<p>iMini Slim Mod Kit - All Colors Available - Authentic</p> <p>SPONSORED</p> <p>\$44.90 Free shipping</p>	<p>NEW Suorin Air Kit V2 100% Authentic Same Day</p> <p>SPONSORED</p> <p>\$19.95 Free shipping</p>	<p>NEW-J.U.U.L-NEW-BASIC KIT + CHARGER. 100% Au-</p> <p>SPONSORED</p> <p>\$34.99 Free shipping</p>	<p>CLASSIC MENTHOL 1 pack 4 pods SHIPS SAME DAY</p> <p>SPONSORED</p> <p>\$17.98 Free shipping</p>
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Figure 2 JUUL device listing on eBay, 26 April 2018.

minors. Listings that mention discreet shipping are also consistent with prior evidence that adults on Reddit have been offering to purchase JUULs from the official website and reselling them to youth in ‘discreet shipping’ with a slight price markup.⁸ Average list prices on eBay were slightly higher than those for identical items on the official JUUL website, which requires users to be 21 years or over to make a purchase. However, many eBay listings had prices lower than that on the official JUUL website, which could be further facilitating youth access. Although the lowest price starter kit was \$29.99, it included a \$19.99 shipping charge. The lowest non-auction, free shipping price for a starter kit was \$40, about 20% less than the official price. Lower prices raise questions about counterfeit JUUL, which may pose additional safety risks to users. Two listings for ‘JUUL clones’, both with prices lower than the JUUL website, were identified among starter kit listings.

After the FDA’s contact with eBay, the vast majority of listings in the original sample were no longer active, and the JUUL brand was removed from the main search page. However, over half of

vendors were still active, suggesting that user bans for violations were not common. For those users who no longer had active listings, it is unclear if they decided to no longer sell on eBay, if they planned to relist items on the account in the future, or if they attempted to create a new account to sell items. Compared with brick and mortar vendors or traditional website-based vendors, tracking vendors on multivendor marketplaces such as eBay poses a unique challenge. JUUL vendors also quickly adapted to eBay’s efforts by using alternate spellings in titles to avoid detection. eBay did not reveal its exact actions to prevent new listings, but it appears to have been limited to blocking listings with the word JUUL in the title. It does not appear to have included listings with the word JUUL used in the body of the listing. This blunts the effect of eBay’s effort to ban the creation of JUUL listings.

The ban was also undercut by eBay’s own search algorithm, which helpfully suggests items with similar spellings to JUUL. Youth who want to find JUUL devices on eBay could still do so. eBay’s algorithms also actively promote the sale of JUUL devices

and pods through the ‘people who viewed this item also viewed’ and ‘similar sponsored items’ fields on each eBay listing. In short, once someone finds a JUUL listing, likely with assistance from eBay’s search algorithm, eBay then directs them to additional JUUL and e-cigarette products for sale on the platform. It appears that the infrastructure of the platform, which is intentionally designed to promote sales and generate profit, is complicating eBay’s efforts to end JUUL sales. Finally, the relatively high number of vendors still selling non-JUUL vaporisers suggests that a piecemeal, brand specific approach is unlikely to be effective at reducing youth access to tobacco products, as vendors and purchasers can switch to other brands of e-cigarettes.

This study has several limitations. JUUL listings in the first period were limited to those classified as JUUL brand in order to focus on the listings that were most readily found by consumers and that eBay could have most easily identified as prohibited products. This may have excluded some listings for JUUL products. Future research should consider the broader search results presented when a search for JUUL is performed. The initial search also did not consider other brands of e-cigarettes. As the post-FDA action analysis revealed listings for other popular brands of e-cigarettes, it is important that future research expand beyond just JUUL brand e-cigarettes to consider e-cigarettes more generally. Additionally, not all listings revealed the date that the listing was last edited or the number of items sold. Use of the date a listing was last edited also underestimates the length of time a listing was live. However, the date a listing first became live is not publicly available. Average list prices may not always reflect true prices since some listings did not have free shipping, some were auctions where the price may be bid up over time and some were best offer where a lower price might be accepted by the vendor. For the post-FDA action data period, it is possible that vendors attempted to make new accounts to further avoid detection. Any new accounts were not captured. As a result, the number of vendors who are still selling JUUL devices may be under-reported.

The online sale of e-cigarettes to minors without age verification is not a new development,^{13 14} although the rapidly growing popularity of JUUL among youth brings renewed attention to the issue. Since online platforms often fail to enforce their own policies and vendors can bypass minor platform changes,^{9 12} more significant policy change appears to be needed. For example, amending the Prevent All Cigarette Trafficking Act (PACT) of 2009 to include e-cigarettes would require internet vendors to confirm the ages of purchasers at the time of purchase and use a delivery service that checks ID. This may encourage platforms like eBay to either enforce their bans more strictly or switch to an age verification model. It should, however, be noted that in the USA, multivendor platforms such as eBay and Amazon have been found to not be liable for the activities of their individual vendors.^{15 16} Regulatory strategies that would be effective for larger e-cigarette vending websites may not be as effective for sales on eBay since vendors can more easily go undetected. The existence of a substantial number of eBay vendors, each with just a few listings, makes enforcement challenging. Accordingly, partnership with multivendor platforms and tools for the identification of individual vendors who list e-cigarettes are critical for enforcement of current regulations, as well as the success of a potential expansion of PACT to include e-cigarettes.

This is a task that platforms themselves are uniquely suited for since it may best be achieved through a search algorithm, although input on what to search for is likely needed from public health professionals and government officials. As noted by Jackler *et al*,⁹ platforms are increasing having to develop

complex algorithms to detect ambiguous concepts such as hate speech. Relatively speaking, an algorithm to detect variants on the spelling of JUUL, or JUUL when mentioned in product descriptions rather than listing titles, would be straightforward. The primary hurdle would be accounting for the fact that spelling variants will continue to change. By July 2018, eBay searches for JUUL showed listings for devices and pods titled, among other variants, JUUL4 and 0JUUL0. These were not seen in the April 2018 analysis. Deactivating the search algorithm that identifies spelling variants for prohibited products and confirming that sponsored items are not prohibited are key to the enforcement of eBay’s already existing ban on e-cigarette sales. The role of algorithms in the identification of prohibited products raises questions about the social desirability of neutral algorithms designed to promote sales. Future studies should explore improvements in automated screening for tobacco products, as well as models for improved partnership and exchange of information about novel tobacco products between public health professionals, government officials and online platforms. Additionally, it would be valuable to revisit the environment on eBay at a future date to explore both the volume of JUUL device and pod listings and the evolving strategies that vendors use to avoid detection.

What this paper adds

- ▶ The flash drive-shaped electronic cigarette device JUUL has become increasingly popular among youth.
- ▶ The US Food and Drug Administration (FDA) contacted the online auction platform eBay in April 2018 to raise concerns about JUUL products being listed for sale.
- ▶ Little is known about youth access to JUUL products, and no prior research has examined JUUL products sold on eBay.
- ▶ Prior to FDA action, JUUL products were commonly sold on eBay and generally lacked language about age restrictions and age verification.
- ▶ Post-FDA action, most JUUL listings were removed; however, new listings were created using spelling variations on JUUL to bypass eBay restrictions on new listings. Vendors also continued to sell other brands of e-cigarettes.

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