Youth say ads for flavored e-liquids are for them

Karma McKelvey[a], **Mike Baiocchi**[b], **Divya Ramamurthi**[c], **Sheila McLaughlin**[a], **Bonnie Halpern-Felsher**[a,*]

[a]Division of Adolescent Medicine, Department of Pediatrics, Stanford University School of Medicine, Palo Alto, CA, USA

[b]Stanford Prevention Research Center, Stanford University, Palo Alto, CA, USA

[c]Stanford Research into the Impact of Tobacco Advertising, Stanford University, Palo Alto, CA, USA

Abstract

Introduction: E-cigarettes are the most popular tobacco product among adolescents and young adults ("AYA") and are available in many flavors. The e-cigarette industry argues that flavors are not meant to appeal to youth, yet no study has asked youth what age group they think ads for flavored e-liquids are targeting. We asked AYA which age group they thought ads for flavored e-liquids targeted.

Methods: In 2016 as part of a larger survey, a random sample of 255 youth from across California (62.4% female, mean age = 17.5, SD = 1.7) viewed eight ads, presented in randomized order, for fruit-, dessert-, alcohol-, and coffee-flavored e-liquids and indicated the age group they thought the ads targeted: younger, same age, a little older, or much older than them. Population means and 95% confidence intervals were estimated using bootstrapping (100,000 replicate samples).

Results: Most participants (93.7%) indicated the cupcake man flavor ad targeted an audience of people younger than they. Over half felt ads for smoothy (68.2%), cherry (63.9%), vanilla cupcake (58%), and caramel cappuccino (50.4%) targeted their age and for no flavor ad did most feel the primary target age group was much older.

Conclusions: Youth believe ads for flavored e-liquids target individuals about their age, not older adults. Findings support the need to regulate flavored e-liquids and associated ads to reduce youth appeal, which ultimately could reduce youth use of e-cigarettes.

1. Introduction

E-cigarettes are the most commonly used tobacco product among adolescents and young adults (NIDA, 2017). E-cigarettes aerosolize glycerin-based liquids, commonly referred to as "e-liquids," which are available in myriad flavors including fruity, sweet, and alcohol (Brown, Luo, Isabelle, & Pankow, 2014). The e-cigarette industry maintains flavored e-liquids are intended for adult smokers using e-cigarettes to quit smoking cigarettes, and supports this claim with industry-sponsored research (Shiffman, Sembower, Pillitteri, Gerlach, & Gitchell, 2015). However, evidence shows that colorful ads depicting e-liquid flavors like those displayed on e-cigarette retail websites are attractive to youth (Grana & Ling, 2014; Lewis & Wackowski, 2006).

Flavor or "taste" is one of the most common persuasive marketing techniques used to promote food (mostly candy and snacks) to children on TV (Jenkin, Madhvani, Signal, & Bowers, 2014). Exposure to these ads is positively associated with youth consumption (Cairns, Angus,Hastings, & Caraher, 2013); and most money spent by youth is on food or beverages, particularly sweets (Kraak, Gootman, & McGinnis, 2006). Not surprisingly, similar research conducted on e-cigarettes comports with these findings, concluding: flavors play an important role for online e-cigarette marketing and boosts user interaction and positive emotion (Liang, Zheng, Zeng, & Zhou, 2015), ads for flavored (vs. unflavored) e-cigarettes elicit greater appeal and interest in buying and trying e-cigarettes (Vasiljevic, Petrescu, & Marteau, 2016), the appeal of ads for flavors is linked to rapid and persistent adoption of e-cigarettes among youth (Zhu, Sun, Bonnevie, et al., 2014), and 84% of US youth who use e-cigarettes stated they would not use e-cigarettes without flavors (Ambrose et al., 2015).

Despite research implicating flavors and the marketing of flavors in youth interest in and use of e-cigarettes (Farrelly, Duke, Crankshaw, et al., 2015; Harrell, Loukas, Jackson, Marti, & Perry, 2017; Jackler & Ramamurthi, 2016; Klein et al., 2016), no study has asked youth what age group they think ads for flavored e-liquids are targeting. In this study, we examined adolescents' and young adults' ("AYA") opinions of which age group(s) ads were targeting, and if target age group differed by flavor group (e.g., sweet, fruit, alcohol, coffee). We hypothesized that AYA would perceive ads, especially those depicting fruit and dessert flavors, to be targeting those around their age group, rather than older adults. Understanding whether and which flavors youth perceive as meant for their age group(s) will inform FDA regulation of e-liquid flavors and associated advertisements.

2. Material and methods

Participants (n = 255; mean age = 17.5, SD = 1.7 [range 14–21, Median age = 18; with only four participants (1.6%) aged 14 and 1(0.4%) aged 21]; 62.4% female; 25.6% ever-used e-cigarettes; 24.2% white, 27.4% Asian/Pacific Islander, 36.1% Latino, and 12.3% other) were

from an ongoing prospective cohort study designed to assess tobacco-related perceptions, exposure to marketing, and use (detailed methods have been published elsewhere (Roditis, Delucchi, Cash, & Halpern-Felsher, 2016; Gorukanti, Delucchi, Ling, Fisher-Travis, & Halpern-Felsher, 2016). Data for this study were collected from June through September 2016 from a random sample of Wave 3 participants (n = 255). There were no differences between the overall sample for Wave 3 (N = 528) and the analytic sample for this study in sex, age, e-cigarette ever-use status or race/ethnicity (all p's > 0.20).

Eight flavors were included: "appletini," "beer," "caramel cappuccino," "kona coffee," "the cupcake man," "vanilla cupcake," "cherry," and "smoothy." Images were randomly chosen from the Stanford Research into the Impact of Tobacco Advertising database (SRITA) and retail websites of e-liquid brands. The SRITA database is an online repository of advertisements that is continuously updated. The images were chosen such that each of the four flavor categories ("alcohol," "coffee," "dessert," and "fruit") had one image that exemplified a traditional advertisement while the other image was of a bottle containing flavored e-liquid. The advertisements selected for the study were current at the time of the study. Included flavor profiles were chosen in part because Reddit conversations at that point in time showed us that fruit and dessert flavors were very popular. Because there were many brands that offered alcohol flavored products, we wanted to add alcohol to see if it was attractive to youth; this was unknown at the time. The selected ads were representative of flavor profiles commonly marketed by popular e-liquid and e-cigarette manufacturers. (See Appendix for ad images, including links to the ads, used in the study). The order in which ads were displayed was randomized. After viewing each ad, and without knowing what ads would come next, participants were asked to select which age group(s) they felt the advertisement targeted (younger than me; my age; a little older [18–24]; much older [parents' age]). Our university's institutional review board approved all study procedures.

We first calculated frequencies and proportions of target-age groups for each ad. A priori, it was decided not to stratify these analyses by e-cigarette use status due to small sample size (n = 65 had ever used) nor by age group (adolescent = 14–17 and young adult = 18+) as 72% of ever-users were ages 18 and over. To inform future research in this area, we conducted secondary analyses which used regressions adjusted for use status and age; these secondary analyses showed no differences in the outcomes of interest by use status or age. Only combined results are reported.

Next, to estimate population means and 95% confidence intervals, we performed a stratified bootstrap analysis with 100,000 replicate samples. The bootstrap is a non-parametric method employed to account for person-to-person variability (Erceg-Hurn and Mirosevich, 2008). This analysis was stratified by prior e-cigarette use, and participants were sampled/ resampled with equal probability within: (i) never used and (ii) some use as reported in Wave 3.

3. Results

Participants predominately identified ads as targeting individuals just a little older than themselves or their own age. Nearly all participants (93.7%) indicated the cupcake man

flavor ad targeted people younger than themselves. More than half of participants felt ads for smoothy (68.2%), cherry (63.9%), vanilla cupcake (58%), and caramel cappuccino (50.4%) targeted people their age (See Supplemental Fig. 1 for details). For none of the flavor ads did a majority of participants believe the target age group was much older (See Fig. 1, which illustrates the proportion of responses attributed to each age group for each flavor).

Bootstrap estimates of the confidence intervals for estimates of population means and 95% confidence intervals, generated by stratified sampling on individuals and prior use of e-cigarettes, are summarized in Fig. 2 (see Supplemental Table 1 for point estimates and upper- and lower-bounds for 95% CI). In sum, mean point estimates for cupcake man are wildly out of line with those for the remaining flavor ads, reflecting the belief among participants that the cupcake man ad targets a younger audience extraordinarily more than any other flavor. Also, there is a slight shifting toward a younger audience being the target for the remaining sweet flavors (i.e., cherry, smoothy, and vanilla cupcake), though nothing so dramatic as for the cupcake man. In other words, "sweets for children."

4. Discussion

Our findings contradict industry-sponsored claims that marketing of flavored e-liquids is not meant for and does not target youth. Instead these results show that AYA perceive flavored e-liquid ads to be targeting people their age (of 17.5 on average) or those a little older (18–24), and in fact at times to be targeting an audience even younger than themselves. It is particularly problematic for the industry-sponsored claims that participants perceived dramatic differences in target-audience age by flavor (Feirman, Lock, Cohen, Holtgrave, & Li, 2016). For example, the cupcake man flavor ad was the most likely to be perceived as targeting younger people; contrastingly, appletini, kona coffee, and beer ads were most likely to be perceived as targeting those much older, although even for these ads, a greater proportion indicated the target age group was someone a little older. The dramatic shifts in the distribution of the histograms by flavor could be explained, at least in part, by an underlying connection between flavors and target audience-age groups in the minds of AYA. Also, the order the flavor ads were displayed was randomized and participants were shown flavors one by one (versus being shown all of the flavors at once). Perhaps AYA would not think about age if unprompted, but it is clear they perceive a difference in target-age by flavor if prompted.

Further, while a content analysis of tobacco-industry ads found intense visual images were important for ad saliency among adolescents (Davis, Gilpin, Loken, Viswanath, & Wakefield, 2008), participants here did not appear to differentially identify target age groups based on how the ad looked. Rather, participants overwhelmingly indicated that all flavors were for people about their age. These findings comport with evidence that tobacco advertising targeting young adults (age 18–24) appeals simultaneously to adolescents since many smokers started as a way to propel themselves into maturity (i.e., smoking serves as a tool for attempts to look older) (Bidstrup, Frederiksen, Siersma, et al., 2009; Barton, Chassin, Presson, & Sherman, 1982; Gerrard, Gibbons, Stock, Lune, & Cleveland, 2005; Halpern-Felsher, Biehl, Kropp, & Rubinstein, 2004; Kremers, Vries, Mudde, & Candel, 2004) and a review showing differences in flavor preferences by age group, with youth

preferring sweet and fruit flavors and being more open to unique and exotic flavors, compared to adults (Feirman et al., 2016; Klein et al., 2008).

This is the first research showing AYA's opinions about the age groups being targeted by ads for flavored e-liquids. These findings should be interpreted within the limits of the data and may not be generalizable to youth outside of California or the U.S. Response options included "my age" and "a little older [18–24];" some participants were 18 years old, so there could have been some overlap. Still, participants were allowed to choose between and among discriminant categories for "target age group," which helps reduce overlap within the measure and serves to bolster robustness of results (Conway & Lance, 2010). Another limitation is our lack of a tobacco-flavored ad; such an ad would further allow us to determine whether all flavors or just non-tobacco flavors most appeal to youth. Also, we did not stratify frequencies and proportions by use status or age and while our data revealed no differences, these variables have been shown to be important determinants of perceptions and use of tobacco products among AYA and should be included in future research. In our bootstrap analysis, we did stratify by e-cigarette ever-use and these results support results from the unstratified analyses.

Our findings are not surprising when one considers the established appeal of flavors to youth in both food and tobacco industry research, which shows AYA are more likely to purchase and use flavored products (Jackler & Ramamurthi, 2016; Jawad, Nakkash, Hawkins, & Akl, 2015; Liang et al., 2015; Vasiljevic et al., 2016). Highlighting flavors in ads for food is known to be one of the most persuasive tactics to influence AYA food consumption behaviors, and it is likely similar in ads for other flavored products (Cairns et al., 2013; Jenkin et al., 2014; Kraak et al., 2006). These findings raise concerns that unregulated advertising of flavored e-liquids will contribute to continued appeal and uptake of e-cigarettes among youth; ultimately increasing associated short- and long-term deleterious health effects.

5. Conclusions

Our findings support FDA regulation of flavored e-liquids, including limiting or banning advertising for flavored tobacco products, given that marketing of flavored e-liquids is a potent strategy used by e-cigarette manufacturers (Clark, Jones, Williams, et al., 2016). Reducing youth exposure to flavored e-liquid ads could have a positive impact on public health by reducing appeal and uptake of e-cigarettes among youth (Aldrich et al., 2015). Lastly, FDA could develop public health and education campaigns to communicate information about harms associated with using flavored e-liquids and e-cigarette use in general.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding

Appendix A.: Ads and links to ads for flavored e-liquids used in 2016 survey of California high school students (N = 255; mean age = 17.5) to discern perceived target age group for each flavor

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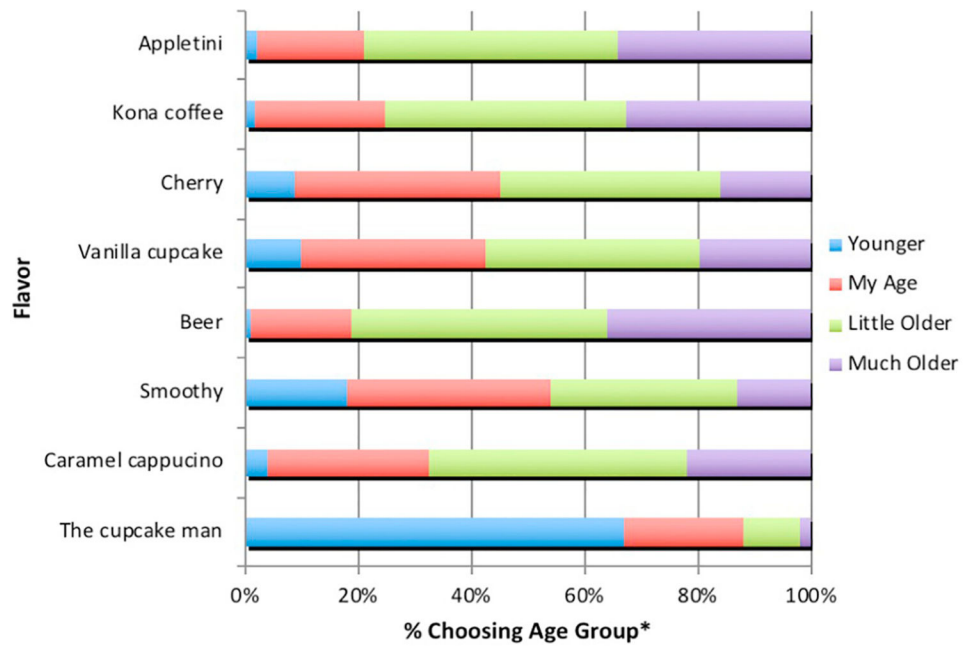
Fig. 1. Target age groups as proportion of total number of responses for each flavor among California adolescents and young adults in 2016 (n = 255; mean age = 17.5).

*Proportions reported in Fig. 1 were calculated using the total number of responses choosing each age group (within each flavor) as the numerator and the total number of responses received for that flavor as the denominator. This was done to account for the fact that participants could choose from 0 to 4 age groups for each flavor, resulting in a diversity of denominators.
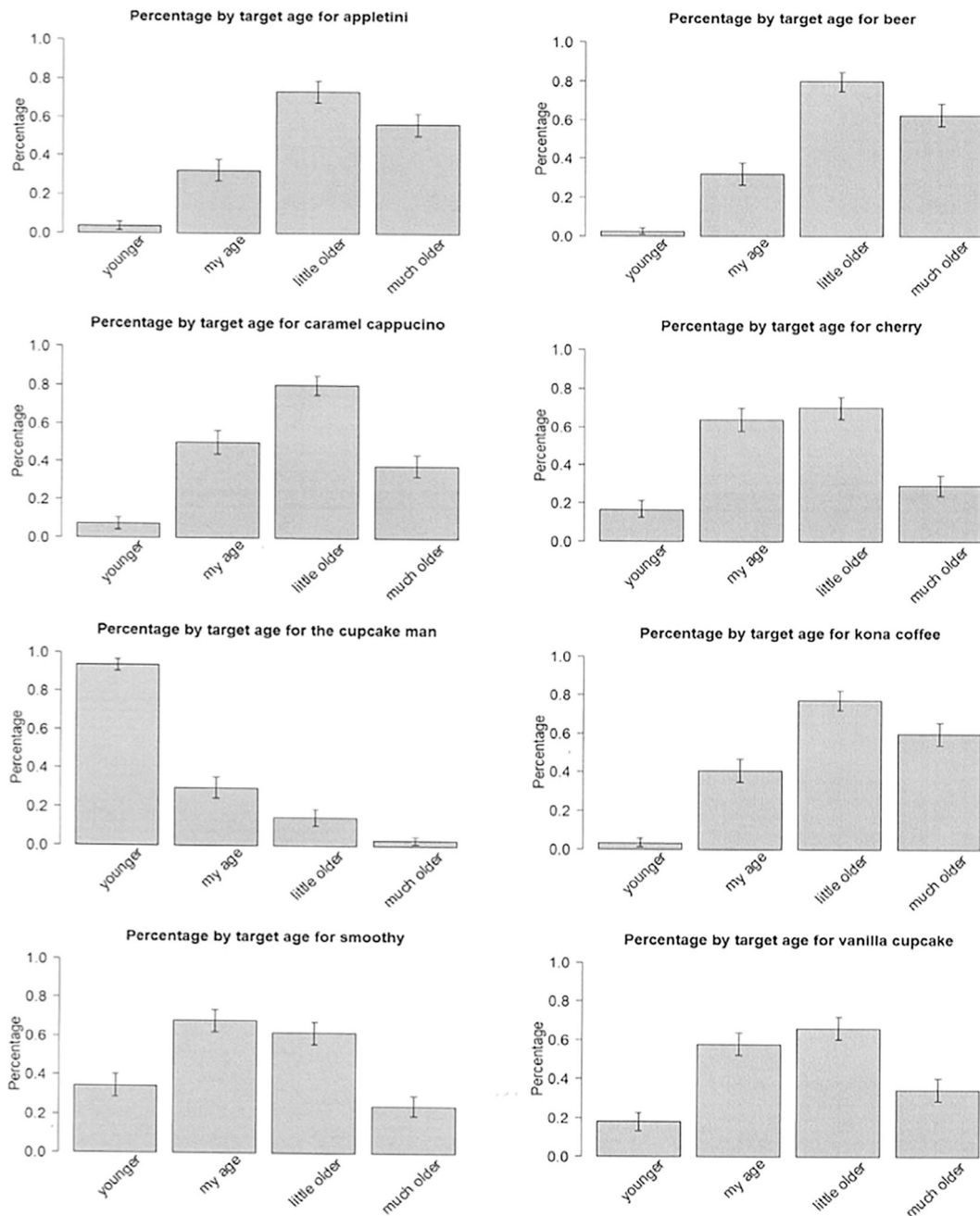
Fig. 2. Estimates of population means and 95% confidence intervals from stratified bootstrapping of 100,000 replicate samples among California adolescents (N = 255; mean age 17.5) surveyed in 2016.

Each category has the potential to have a height of 1 (i.e., probability 1), if all respondents selected a particular age-category as appropriate to the given flavor. Respondents were able to choose all age-categories they believed applied to each flavor, thus sum of all age-categories within a given flavor add to > 1. The confidence interval for each age-category represents the sampling variability, showing bootstrap upper and lower bounds.