



Youth attention, perceptions, and appeal in response to e-cigarette advertising features: A focus group study

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ABSTRACT

Background: E-cigarette marketing exposure may influence vaping-related outcomes among youth, but less is known on which specific advertising features impact youth attention, perceptions, and appeal. This study qualitatively examines responses to different e-cigarette advertising features among e-cigarette-naïve youth.

Methods: We conducted four online focus groups in 2021 with a national U.S. sample of 13–17 year olds (n = 25) who had never used e-cigarettes. Participants viewed and discussed their reactions to different e-cigarette advertisements varying in the inclusion of ad features, including color, models in imagery, text claims targeting smokers, and the nicotine warning label.

Results: Participants were attracted to ads with bright colors, particularly when contrasted against a dark background. Ads featuring models attracted attention and reduced perceptions that the product is harmful. Comments indicated mixed reactions to smoker-targeted text claims. On one hand, participants perceived ads with text that specified “for smokers” as targeting older adults. On the other hand, text referring to “switching” from cigarettes to e-cigarettes led to some perceptions that the product is healthy, and certain text that implicitly referred to smoking (e.g., “no odor”) had the potential to appeal to youth who wanted to use e-cigarettes discreetly. The level of attention paid to warnings depended on warning size and the color contrast between the warning and the rest of the ad.

Conclusions: Findings suggest specific e-cigarette ad features play an important role in attracting youth attention and influencing perceptions. More research is needed on the potential public health benefits versus unintended consequences of smoker-targeted text claims.

1. Introduction

Youth vaping continues to be a concern in the United States (U.S.), as e-cigarettes expose users to carcinogens (Rubinstein et al., 2018) and other harmful substances such as nicotine (England et al., 2015; Centers for Disease Control and Prevention, 2016). E-cigarettes remain the most commonly used tobacco/nicotine product among youth (Birdsey, 2023) – in 2023, 10% of high school students reported current e-cigarette use (Birdsey, 2023). Additionally, U.S. youth exposure to e-cigarette advertising has increased over time (Li et al., 2021). In the context of widespread advertising, it is concerning that youth exposure to e-cigarette advertisements is associated with increased susceptibility (Padon et al., 2018; Farrelly et al., 2015; Mantey et al., 2016) and use (Chen-

Sankey et al., 2019; Nicksic et al., 2017; Stanton et al., 2022; Do et al., 2022). Thus, it is important to identify how e-cigarette advertisements capture attention and lead to use. The hierarchy-of-effects in advertising model posits that effective advertising elicits a series of intermediate processes, including message noticing and developing positive affective responses, ultimately resulting in product purchase (Barry and Howard, 1990). While there is evidence that e-cigarette marketing appeals to youth (Farrelly et al., 2015; Mantey et al., 2016), less is known about the role of specific ad features.

The use of models, particularly those who appear young, which is common in e-cigarette marketing (Silver et al., 2022; Struik et al., 2020; Padon et al., 2017), has been found to increase ad appeal (Kim et al., 2020; Chen-Sankey et al., 2022) and attract more attention than other ad

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features (Stevens et al., 2020) among young adults. Studies have also documented the appeal of bright colors (Chen et al., 2020; Chopel et al., 2019; Johnson et al., 2017), a common feature of e-cigarette advertising (Struik et al., 2020; Moran et al., 2019). Importantly, while some ad features may enhance youth appeal, others have the potential to reduce appeal, such as text claims that specify the product is for adult smokers and mandated nicotine warning labels. A study of non-tobacco-using young adults found that noticing nicotine warnings and smoking cessation claims was negatively associated with ad liking and product interest (Chen-Sankey et al., 2022). It is also possible that appealing ad features may reduce attention to and effectiveness of health warnings, as found in a recent young adult neuroimaging study (Garrison et al., 2018). However, research has thus far focused on young adults (Chen-Sankey et al., 2022; Stevens et al., 2020), and the few youth studies have not examined responses to individual ad features (Chen et al., 2020; Chopel et al., 2019; Johnson et al., 2017).

Understanding how youth – particularly e-cigarette-naïve youth – react to e-cigarette ad features has regulatory significance. The U.S. Food and Drug Administration (FDA) requires companies obtain marketing authorizations for e-cigarettes and application review includes an examination of their marketing plan and the potential for ads to appeal to non-users (United States Food and Drug Administration, 2016; United States Food and Drug Administration, 2022). Thus, this study aims to qualitatively explore how e-cigarette-naïve youth react to individual e-cigarette advertisement features, the findings of which may inform regulatory policy.

2. Methods

2.1. Participants

In February 2021, we conducted four online focus groups with a national sample of 25 youth (ages 13–17) who had never used e-cigarettes (see Table 1 for participant demographics). Each group comprised 4–8 participants; groups were divided by age range (13–15 vs 16–17) to maximize homogeneity in age and experience. Teen participants were recruited through NORC's probability-based AmeriSpeak panel, designed to be representative of the U.S. household population. Consent letters were sent to parents of potential participants, and only those whose parents provided consent were contacted to gauge interest in participating and eligibility. The first 40 teens who were deemed eligible

Table 1
Distribution of demographic characteristics among U.S. youth focus group participants (N = 25), February 2021.

	%
Sex	
Male	40
Female	60
Age, years	
13–15	56
16–17	44
Race/Ethnicity	
White, non-Hispanic	52
Black, non-Hispanic	12
Asian, non-Hispanic	4
Other, non-Hispanic	0
2 or more races, Non-Hispanic	8
Hispanic	24
U.S. Region	
Northeast	12
South	40
Midwest	36
West	8

were invited to the study; of these, 25 enrolled. Participants provided verbal assent at the start of the session after hearing their rights and confidentiality statement.

2.2. Study procedures

Each session lasted 60 minutes and was recorded. The study's principal investigator (MJ) moderated each session (see Supplemental File 1 for moderator guide), while research team members took notes. After an icebreaker, sessions began with a general discussion about e-cigarettes, including participants' awareness/beliefs regarding e-cigarettes and their consequences, as well as their exposure to e-cigarette marketing. Participants were then shown several real-world e-cigarette print and online advertisements from different brands (JUUL, Vuse, Blu, and Logic) (Supplemental File 2). First, they were shown four different e-cigarette ads. After each one, participants typed in their initial thoughts about the ad in the chatbox, which were used to initiate group discussions pertaining to attention to and perceptions toward different ad features (i.e., color, imagery, text claims, warning label), as well as overall memorability and appeal. Next, they were shown five pairs of e-cigarette ads that varied in their inclusion of color, models, and smoker-targeted claims, and were asked to compare each pair in terms of attention, perceptions, and appeal. Finally, they were shown four new ads and asked to pick the one most attention-grabbing and appealing to young people. The session ended with a discussion of which ad was most memorable out of all the ads they saw, and a debrief of e-cigarette risks to youth. Participants received a \$50 cash-equivalent incentive from NORC. The study was approved by the institution's Institutional Review Board.

2.3. Data analyses

Transcripts were cleaned and imported into Atlas.ti software. Data were coded and analyzed using a thematic analysis approach, similar to previous studies (Gratale et al., 2022). The principal investigator developed a coding guide that included codes within major categories of interest (i.e., sources of e-cigarette information/beliefs, ad color, ad text, ad imagery, warning label, other outcomes, miscellaneous features), building on questions from the moderator guide and initial notes from repeated transcript readings. Using this coding guide, two team members (MJ, CU) coded all transcripts and drafted a results narrative, reviewing numerous example quotes and selecting those that would best exemplify the findings in the narrative.

3. Results

3.1. Color and design

For the most part, participants indicated that ads with bright colors caught their attention/made the ad more appealing, noting that this was particularly true when the colors contrasted against a dark background.

"...the color of the box. It's red...more appealing to the eye it stands out more." (male, age 15 years)

"...even with the black, the pop of color helps catch your eye more than other ads." (female, age 16 years)

Participants also commented that brightly colored ads seemed to be targeting and/or would be appealing to younger people.

"I think this one is targeting younger people. They're still targeting people who are actually old enough to buy the product but I feel like if a high schooler saw that they might think, Oh...this is bright...that might be my scene." (female, age 16 years)

"...at my high school at least...everyone likes really bright things...and things that just kind of [seem] unique and out-of-the-world-type

deal. This ad would definitely catch their attention and want them to get [the product].” (female, age 14 years)

Conversely, participants noted that ads with muted or monochrome colors did not catch their attention and were likely targeting adults.

“...not even really eye-catching to me, it’s kind of very bland...it wouldn’t make me want to like vape or anything.” (female, age 16 years)

“It’s adult-themed...because it’s not bright colors. It’s just blank.” (female, age 14 years)

However, some youth did note that ads with subdued, minimal designs were sometimes *more* appealing than ads with multiple design elements.

“I feel like when there’s less going on in an ad, it’s more appealing. Whereas, kinda with the other one there was too much going on. And I wanted to kind of look away...” (female, age 16 years)

“...it seems a little more like modern...it seems like a sleek simple design doesn’t seem that they’re trying to do too much...it’s still like attractive.” (male, age 14 years)

Interestingly, several participants commented on the overall aesthetic of the ads beyond just color, including how that affected perceptions of who the ad was targeting.

“...it looks more like a perfume commercial than a vape commercial...makes me think of a classier product.” (female, age 16 years)

“...kind of a shameless ad. I mean it looks like a Sprite ad...so like, it’s not very obviously marketed towards adults, which means it’s kind of marketed towards kids...just messed up.” (male, age 15 years)

3.2. Models

Many participants indicated that ads featuring models seemed more personal and relatable, and caught their attention more often. One person commented it caught their attention when the model was ‘looking at’ them.

“...having a face connecting it...it makes it more personal.” (male, age 16 years)

“Just because there is like someone looking at me. Like actually looking at me. Definitely caught my eye first...” (female, age 16 years)

Some added that these ads were especially eye-catching/appealing when the model was ‘young,’ ‘cool,’ and ‘having fun.’

“She does look like she’s having fun. She looks young she looks like she’s probably in her 20s...she looks like she’s actually enjoying herself.” (female, age 16 years)

Several participants commented that the model affected their perceptions of the target audience. One participant commented that the target was unclear because of the mismatch between the model’s age and the ad text: “...[the model] is very young. So what are the odds she’s been, you know, like a past smoker. But then the text is like, hey, this is for previous smokers when you see this young lady and it’s like, that doesn’t really align...you’d think it’d be like an older lady or an older guy using the vape” (female, age 16 years).

Importantly, participants indicated that seeing models reduced perceptions that the product was harmful. Several participants added that this was true when the model was shown using the product or seemed to be displaying positive emotions.

“...makes it seem less harmful because it’s actually like showing a person...like using the product.” (female, age 16 years)

“...made it seem less harmful just because...I can see...this person’s like happy.” (male, age 16 years)

One participant commented that their harm perceptions were reduced because the model looked older: “it looks like an older person. So like if they’re doing it...it must be okay for me...” (female, age 16 years).

3.3. Smoker-targeted language

Overall, participants showed mixed reactions to text claims that included smoker-targeted language. On one hand, participants generally perceived ads with claims that explicitly mentioned smoking/smokers as targeting older adults.

“It’s more marketed towards adults, because you can tell this [is] designed for adult smokers and not for minors.” (female, age 16 years)

“...not that many young people can relate to someone who has smoked for 20 years.” (female, age 16 years)

On the other hand, smoker-targeted language seemed to have the potential to produce unintended consequences. For one, text referencing “switching” (from cigarettes to the product featured in the ad) led to participants perceiving the product as healthier than smoking cigarettes.

“It made it seem that like she stopped smoking like she overcame smoking, like Juul is like healthier and healthier option...” (female, age 13 years)

“It makes it look like it’s more like a healthier alternative to smoking.” (female, age 14 years)

Furthermore, many participants pointed out that text claims that implicitly compared the product to cigarettes (e.g., “no ash,” “no odor”) could be appealing to youth who wanted to be discreet.

“...if you’re a teenager and you want to smoke and you want to get away with it, you’re going to go with an e-cigarette because it’s easy to hide. It doesn’t smell as bad, you know.” (female, age 16 years)

“There’s no ash no odor no mess, you can’t really get caught with it as easily as if you were actually smoking a cigarette.” (female, age 14 years)

One participant noted that such claims appealing to the device’s discreetness could be perceived as targeting youth: “I feel like the ‘smooth and quiet’ part is like, so you don’t get caught vaping I feel like that’s targeted towards teens” (female, age 16 years).

3.4. Warning label

Although the nicotine warning influenced some participants’ perceptions of the product (e.g., “...can be addictive...[at] the top, it says that nicotine is an addictive chemical,” female, age 13 years), most participants commented that they only noticed the warning after looking at the rest of the ad, including color and imagery.

“I saw the picture first and then I went to the warning, and then I saw like all the rest of the information at the bottom.” (female, age 16 years)

“They made [the warning] blend in more. And I think they made the main part of the ad bright blue so like your eyes were like more attracted to the main part of the ad.” (female, age 13 years)

Participants generally paid more attention to warnings that were larger, with bigger text size, and noticed the warning sooner when the warning color contrasted with the ad and/or the rest of the ad was muted in color:

(in response to a blu ad with muted colors and black warning with white text): “...the big warning sign [was] the first thing that stood out the most to me.” (male, age 16 years)

“Because [the warning] has the white background against the black [ad] background so it stands out more.” (female, age 14 years)

However, there was some confusion as to whether the warning label was part of the ad. One participant asked whether the “big writing at the top” was part of the ad (male, age 16 years). Other participants pointed out that in one brightly colored ad with a black warning, the “warning looks kind of disjointed... you may not have associated the warning with the ad” (male, age 16 years), and that “it seems like there’s kind of like a theme to the ad and then the borders help make the warning look like it’s separate” (female, age 16 years). The point came up again in another ad: “...it seems more like cohesive, because this [warning] is kind of enclosed in the ad. So you can definitely tell this goes with this product” (female, age 16 years).

4. Discussion

This study provides important descriptions from youths’ own perspectives about the role of various e-cigarette ad features in attracting attention, and the way these features may work to influence harm perceptions and garner appeal. In line with prior research (Johnson et al., 2017; Liu et al., 2020), bright colors attracted attention and enhanced ad recall and appeal, particularly when contrasted against a darker background. Additionally, color has long been used by the tobacco industry to convey flavors and harshness (Lempert and Glantz, 2017; Wakefield et al., 2010); bright colors in advertisements may lead to positive taste perceptions (Lempert and Glantz, 2017) in the absence of actual flavors among cartridge-based e-cigarettes (United States Food and Drug Administration, 2020a). Results also suggest that youth perceive brightly colored ads as targeting young people, which may impact interest in the product. Our findings, which could be bolstered by experiments examining ad color’s effects on youth perceptions and use intentions, suggest that use of bright colors in proposed marketing materials may be considered in FDA marketing authorization reviews. Interestingly, youth also commented on the appeal of minimalistic, simple aesthetics, suggesting that even in the absence of color, e-cigarette brands could utilize other design elements to appeal to youth, necessitating continued research in this domain.

Prior research has shown that people in e-cigarette ads attract attention (Chen-Sankey et al., 2022; Stevens et al., 2020), and this study suggests this is also true among youth. Participants cited the sense of personal relevance that comes from seeing a person in the ad as an appealing factor. Visual communication theories suggest that identification with models increases ad engagement and, subsequently, susceptibility (Messaris, 1997). Since 2018, e-cigarette ads mostly featured adults, albeit often adults who look young, due to increased scrutiny and public pressure regarding youth-targeting marketing (United States Food and Drug Administration, 2020b). However, use of young adult models may still appeal to adolescents; in fact, our study showed that participants were attracted to ads featuring adult models who seemed “young and cool.” Adolescents recognize 25–26-year-olds as the “ideal self” and find marketing with models of this age for age-restricted products, like e-cigarettes, particularly appealing (Pezzuti et al., 2015). Given that the legal age of e-cigarette sale is 21, marketing regulations could consider explicitly restricting the age of models in tobacco advertising to older adults, who do not seem to have an effect on youth (Pezzuti et al., 2015), but may resonate with adults who smoke and wish to quit. Importantly, recent settlements between JUUL Labs and more than 40 U.S. states and territories required JUUL to halt the use of people under 35 years old in their promotional materials, potentially paving the way for similar restrictions for all e-cigarette brands.

Models were also likely to reduce perceptions that e-cigarettes are harmful. Marketing research has long shown the ability of attractive models to create a positive halo around the product itself (Baker and Churchill, 1977), but as evidenced by several quotations in our study, certain characteristics of the model may contribute to these lower risk perceptions, such as their facial emotions or use of the product. Given that lower perceived risks of e-cigarettes have been found to be

associated with e-cigarette use (Barrington-Trimis et al., 2015), research is warranted to tease apart the features that lead to reduced harm perceptions and subsequently make specific recommendations regarding the use of people in e-cigarette ads.

Text claims targeting adults who smoke may have both the intended effects of reducing relevance to youth as well as the unintended effects of enhancing youth appeal and reducing youths’ harm perceptions. These claims usually contain explicit or implicit comparisons to combustible cigarettes, which sometimes showcase qualities of the product that may be attractive to youth (such as lack of odor or overall discreetness). We found that claims that mention benefits of switching from cigarettes to e-cigarettes had the potential to promote youths’ beliefs that e-cigarettes were less harmful than cigarettes. Though previous research has shown that such claims may minimize e-cigarette appeal among young adults who don’t use tobacco (Chen-Sankey et al., 2022), our findings suggest that the full story – particularly in the context of e-cigarette-naïve youth – may be more nuanced. Future studies would benefit from experimentally evaluating the impact of smoker-targeted claims on both relative and absolute harm perceptions among youth and on product interest, to assess the public health benefits of using such smoker-targeted language and curbing youth appeal versus the potential unintended consequences of attracting more youth. Furthermore, our findings suggest that the presence of young models may potentially offset the intended impact of text claims targeting adults who smoke, in terms of youths’ perceptions of who the target audience is. This points to the need for more research on how different e-cigarette ad features (such as smoker-targeted claims and images of people) interact among youth.

While the warning label is required on all e-cigarette ads and has the potential to deter young people when noticed (Chen-Sankey et al., 2022), previous studies among young adults have shown that warnings in the context of e-cigarette ads drew almost no attention (as opposed to other branding elements) (Mays et al., 2016) and had no influence on e-cigarette perceptions or intentions (Mays et al., 2016; Wackowski et al., 2019). We found attention to warnings depended on warning-specific factors such as warning size and the color contrast with the rest of the ad, consistent with prior research (Mays et al., 2019). Moreover, we found the level of attention paid to the warning varied based on other ad features, including the ad colors and presence of models. Importantly, some participants pointed out that, in some ads, the warning did not seem like it was part of the ad due to factors such as color contrast and borders, which is troubling given that youth may process the contents of e-cigarette advertising without the buffer of the nicotine warning. Ultimately, there is a need for continued research examining optimal e-cigarette warning design in the context of various e-cigarette ad features to inform FDA policy on warnings and marketing restrictions.

Limitations of this study include use of an online platform to conduct the focus groups, which may have hindered interactivity compared to in-person sessions. However, benefits of conducting online focus groups included the ability to acquire a national sample (i.e., no geographic restrictions), and remote participation following COVID-19. Data were derived from 25 youth across four focus groups, arguably a small sample size although research suggests that data saturation is usually reached by 4–8 focus groups (Hennink and Kaiser, 2022). Still, the study’s contributions are valuable as there are limited qualitative studies done with youth in this research domain, and these focus groups provide rich data that is not possible with larger online surveys. Advertisements shown to participants did not include ads of disposable e-cigarettes (which are increasingly used among youth (Birdsey, 2023)) and social media (which is becoming one of the primary sources of e-cigarette-related content among youth (Gentzke, 2022)), and future research should take these ads into consideration. Similar to other focus group studies, there is the possibility that factors such as group dynamics or moderator characteristics may have influenced results. For instance, participants may have held back opinions because the moderator seemed older than them or if other group members seemed more outspoken (despite efforts to engage all participants equally throughout sessions). Study

procedures and data interpretation may have also been influenced by the study team's experiences as public health academic researchers and non-tobacco users with an interest in youth e-cigarette prevention.

5. Conclusion

Overall, findings suggest that among e-cigarette-naïve youth, e-cigarette marketing features such as color, models, and smoker-targeted claims have an impact on attention, harm perceptions, and appeal. However, our study suggests that the impact of these features is not straightforward. In particular, text claims containing smoker-targeted language, intended to minimize youth appeal, have the potential to reduce harm perceptions and increase appeal among some youth. Findings point to the importance of continued research examining specific ad features that will better inform regulatory policy regarding marketing restrictions that will prevent youth initiation. Findings also suggest that attention to the nicotine warning may depend on warning characteristics and the presence of other ad features, necessitating continued research examining interactions between ad features and the warning label, as well as optimal warning design in preventing youth uptake of e-cigarettes.

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Michelle Jeong: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Caitlin Weiger:** Writing – review & editing, Writing – original draft. **Caitlin Uriarte:** Writing – review & editing, Data curation. **Olivia A. Wackowski:** Writing – review & editing, Methodology. **Cristine D. Delnevo:** Writing – review & editing, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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Appendix A. Supplementary data

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References

Baker, M.J., Churchill, G.A., 1977. The impact of physically attractive models on advertising evaluations. *J Mark Res.* 14 (4), 538–555. <https://doi.org/10.1177/002224377701400411>.
Barrington-Trimis, J.L., Berhane, K., Unger, J.B., et al., 2015. Psychosocial factors associated with adolescent electronic cigarette and cigarette use. *Pediatrics* 136 (2), 308–317. <https://doi.org/10.1542/peds.2015-0639>.

Barry, T.E., Howard, D.J., 1990. A review and critique of the hierarchy of effects in advertising. *Int J Advert.* 9 (2) <https://doi.org/10.1080/02650487.1990.11107138>.
Birdsey, J., 2023. Tobacco product use among U.S. middle and high school students — National Youth Tobacco Survey, 2023. *MMWR Morb Mortal Wkly Rep.* 72. <https://doi.org/10.15585/mmwr.mm7244a1>.
United States Food and Drug Administration. Premarket Tobacco Product Applications. Published August 23, 2022. Accessed October 17, 2022. <https://www.fda.gov/tobacco-products/market-and-distribute-tobacco-product/premarket-tobacco-product-applications>.
Centers for Disease Control and Prevention. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General*. U.S. Department of Health and Human Services; 2016. <https://www.ncbi.nlm.nih.gov/books/NBK538680/>.
Chen, Y., Tilden, C., Vernberg, D.K., 2020. Adolescents' interpretations of e-cigarette advertising and their engagement with e-cigarette information: Results from five focus groups. *Psychol Health.* 35 (2), 163–176. <https://doi.org/10.1080/08870446.2019.1652752>.
Chen-Sankey, J., Jeong, M., Wackowski, O.A., et al., 2022. Noticing people, discounts and non-tobacco flavours in e-cigarette ads may increase e-cigarette product appeal among non-tobacco-using young adults. *Tob Control.* Published online June 7, 2022. <https://doi.org/10.1136/tobaccocontrol-2022-057269>.
Chen-Sankey, J.C., Unger, J.B., Bansal-Travers, M., Niederdeppe, J., Bernat, E., Choi, K., 2019. E-cigarette marketing exposure and subsequent experimentation among youth and young adults. *Pediatrics* 144 (5), e20191119.
Chopel, A., Lee, R.E., Ortiz-Matute, E., et al., 2019. The META-OAK Project: Using photovoice to investigate youth perspectives on tobacco companies' marketing of e-cigarettes toward adolescents in Oakland, 2158244019857420 *SAGE Open* 9 (3). <https://doi.org/10.1177/2158244019857420>.
Do, V.V., Nyman, A.L., Kim, Y., Emery, S.L., Weaver, S.R., Huang, J., 2022. Association between e-cigarette advertising exposure and use of e-cigarettes among a cohort of U.S. youth and young adults. *Int J Environ Res Public Health.* 19(19):12640 <https://doi.org/10.3390/ijerph191912640>.
England, L.J., Bunnell, R.E., Pechacek, T.F., Tong, V.T., McAfee, T.A., 2015. Nicotine and the developing human. *Am J Prev Med.* 49 (2), 286–293. <https://doi.org/10.1016/j.amepre.2015.01.015>.
Farrelly, M.C., Duke, J.C., Crankshaw, E.C., et al., 2015. A randomized trial of the effect of e-cigarette TV advertisements on intentions to use e-cigarettes. *Am J Prev Med.* 49 (5), 686–693. <https://doi.org/10.1016/j.amepre.2015.05.010>.
Garrison, K.A., O'Malley, S.S., Gueorguieva, R., Krishnan-Sarin, S., 2018. A fMRI study on the impact of advertising for flavored e-cigarettes on susceptible young adults. *Drug Alcohol Depend.* 186, 233–241. <https://doi.org/10.1016/j.drugalcdep.2018.01.026>.
Gentzke, A.S., 2022. Tobacco product use and associated factors among middle and high school students — National Youth Tobacco Survey, United States, 2021. *MMWR Surveill Summ.* 71. <https://doi.org/10.15585/mmwr.ss7105a1>.
Gratale, S.K., Jeong, M., Sidhu, A., et al., 2022. Young adults' cigarillo risk perceptions, attention to warning labels and perceptions of proposed pictorial warnings: A focus group study. *BMJ Open* 12 (6), e061064.
Hennink, M., Kaiser, B.N., 2022. Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Soc Sci Med.* 292, 114523 <https://doi.org/10.1016/j.socscimed.2021.114523>.
Johnson, A.C., Mays, D., Hawkins, K.B., Denzel, M., Tercyak, K.P., 2017. A qualitative study of adolescent perceptions of electronic cigarettes and their marketing: Implications for prevention and policy. *Child Health Care.* 46 (4), 379–392. <https://doi.org/10.1080/02739615.2016.1227937>.
Kim, M., Olson, S., Jordan, J.W., Ling, P.M., 2020. Peer crowd-based targeting in e-cigarette advertisements: A qualitative study to inform counter-marketing. *BMC Public Health* 20 (1), 32. <https://doi.org/10.1186/s12889-019-8126-x>.
Lempert, L.K., Glantz, S., 2017. Packaging colour research by tobacco companies: The pack as a product characteristic. *Tob Control.* 26 (3), 307–315. <https://doi.org/10.1136/tobaccocontrol-2015-052656>.
Li, X., Kaiser, N., Borodovsky, J.T., et al., 2021. National trends of adolescent exposure to tobacco advertisements: 2012–2020. *Pediatrics* 148 (6), e2021050495. <https://doi.org/10.1542/peds.2021-050495>.
Liu, J., McLaughlin, S., Lazaro, A., Halpern-Felsher, B., 2020. What does it meme? A qualitative analysis of adolescents' perceptions of tobacco and marijuana messaging. *Public Health Rep.* 135 (5), 578–586. <https://doi.org/10.1177/0033354920947399>.
Mantey, D.S., Cooper, M.R., Clendennen, S.L., Pasch, K.E., Perry, C.L., 2016. E-cigarette marketing exposure is associated with e-cigarette use among US youth. *J Adolesc Health.* 58 (6), 686–690. <https://doi.org/10.1016/j.jadohealth.2016.03.003>.
Mays, D., Smith, C., Johnson, A.C., Tercyak, K.P., Niaura, R.S., 2016. An experimental study of the effects of electronic cigarette warnings on young adult nonsmokers' perceptions and behavioral intentions. *Tob Induc Dis.* 14 (1), 17. <https://doi.org/10.1186/s12971-016-0083-x>.
Mays, D., Villanti, A., Niaura, R.S., Lindblom, E.N., Strasser, A.A., 2019. The effects of varying electronic cigarette warning label design features on attention, recall, and product perceptions among young adults. *Health Commun.* 34 (3), 317–324. <https://doi.org/10.1080/10410236.2017.1372050>.
Messaris, P., 1997. *Visual Persuasion: The Role of Images in Advertising*. Sage Publications.
Moran, M.B., Heley, K., Baldwin, K., Xiao, C., Lin, V., Pierce, J.P., 2019. Selling tobacco: A comprehensive analysis of the U.S. tobacco advertising landscape. *Addict Behav.* 96, 100–109. <https://doi.org/10.1016/j.addbeh.2019.04.024>.
Nicksic, N.E., Harrell, M.B., Pérez, A., Pasch, K.E., Perry, C.L., 2017. Recall of e-cigarette advertisements and adolescent e-cigarette use. *Tob Regul Sci.* 3 (2), 210–221. <https://doi.org/10.18001/TRS.3.2.9>.

- Padon, A.A., Maloney, E.K., Cappella, J.N., 2017. Youth-targeted e-cigarette marketing in the US. *Tob Regul Sci.* 3 (1), 95–101. <https://doi.org/10.18001/TRS.3.1.9>.
- Padon, A.A., Lochbuehler, K., Maloney, E.K., Cappella, J.N., 2018. A randomized trial of the effect of youth appealing e-cigarette advertising on susceptibility to use e-cigarettes among youth. *Nicotine Tob Res.* 20 (8), 954–961. <https://doi.org/10.1093/ntr/ntx155>.
- Pezzuti, T., Pirouz, D., Pechmann, C., 2015. The effects of advertising models for age-restricted products and self-concept discrepancy on advertising outcomes among young adolescents. *J Consum Psychol.* 25 (3), 519–529. <https://doi.org/10.1016/j.jcps.2015.01.009>.
- Rubinstein, M.L., Delucchi, K., Benowitz, N.L., Ramo, D.E., 2018. Adolescent exposure to toxic volatile organic chemicals from e-cigarettes. *Pediatrics* 141 (4), e20173557.
- Silver, N., Rahman, B., Folger, S., et al., 2022. A content analysis of promotional features in US direct-mail from advertisements across tobacco products from 2018 to 2020. *Nicotine Tob Res.* 24 (10), 1627–1634. <https://doi.org/10.1093/ntr/ntac095>.
- Stanton, C.A., Pasch, K.E., Pericot-Valverde, I., et al., 2022. Longitudinal associations between U.S. youth exposure to e-cigarette marketing and e-cigarette use harm perception and behavior change. *Prev Med.* 164, 107266 <https://doi.org/10.1016/j.ypmed.2022.107266>.
- Stevens, E.M., Johnson, A.L., Leshner, G., et al., 2020. People in e-cigarette ads attract more attention: An eye-tracking study. *Tob Regul Sci.* 6 (2), 105–117. <https://doi.org/10.18001/TRS.6.2.3>.
- Struik, L.L., Dow-Fleisner, S., Belliveau, M., Thompson, D., Janke, R., 2020. Tactics for drawing youth to vaping: Content analysis of electronic cigarette advertisements. *J Med Internet Res.* 22 (8), e18943.
- United States Food and Drug Administration. Deeming Tobacco Products To Be Subject to the Federal Food, Drug, and Cosmetic Act, as Amended by the Family Smoking Prevention and Tobacco Control Act; Restrictions on the Sale and Distribution of Tobacco Products and Required Warning Statements for Tobacco Products. Federal Register. Published May 10, 2016. Accessed October 17, 2022. <https://www.federalregister.gov/documents/2016/05/10/2016-10685/deeming-tobacco-products-to-be-subject-to-the-federal-food-drug-and-cosmetic-act-as-amended-by-the>.
- United States Food and Drug Administration. FDA finalizes enforcement policy on unauthorized flavored cartridge-based e-cigarettes that appeal to children, including fruit and mint. FDA. Published March 24, 2020. Accessed October 25, 2022. <https://www.fda.gov/news-events/press-announcements/fda-finalizes-enforcement-policy-unauthorized-flavored-cartridge-based-e-cigarettes-appeal-children>.
- United States Food and Drug Administration. FDA takes new steps to address epidemic of youth e-cigarette use, including a historic action against more than 1,300 retailers and 5 major manufacturers for their roles perpetuating youth access. FDA. Published March 24, 2020. Accessed May 23, 2023. <https://www.fda.gov/news-events/press-announcements/fda-takes-new-steps-address-epidemic-youth-e-cigarette-use-including-historic-action-against-more>.
- Wackowski, O.A., Sontag, J.M., Hammond, D., et al., 2019. The impact of e-cigarette warnings, warning themes and inclusion of relative harm statements on young adults' e-cigarette perceptions and use intentions. *Int J Environ Res Public Health.* 16 (2), 184. <https://doi.org/10.3390/ijerph16020184>.
- Wakefield, M., Morley, C., Horan, J.K., Cummings, K.M., 2010. The cigarette pack as image: New evidence from tobacco industry documents. *Tob Control.* 11 (Supplement 1), i73–i80. https://doi.org/10.1136/tc.11.suppl_1.i73.