

# E-cigarette flavors decrease perception of harm among youth

October 24 2019, by Mark Derewicz

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Hannah Baker, MPH. Credit: UNC

As more and more youth use electronic cigarettes, combined with research showing the health consequences of vaping—including nicotine addiction—researchers at the University of North Carolina-Chapel Hill found that non-menthol flavors attract youth and adults to use e-cigarettes and that the use of flavored e-cigarettes contributes to multiple pathways linked to higher e-cigarette use among youth.

The study, published in the *British Medical Journal Open*, is a systematic review of all peer-reviewed scientific literature published on [e-cigarette](#) use behaviors and perceptions through March of 2018. The researchers reviewed 51 articles, including 17 published before 2016 and 34 published between 2016 and 2018.

The researchers found:

- Five studies indicate that non-menthol flavors in e-cigarettes decrease the perception that e-cigarettes are harmful, particularly fruit and candy flavors.
- Six studies indicate that flavors increase the willingness of youth and [young adults](#) to try or initiate the use of e-cigarettes.
- Seven studies showed that flavors increase product appeal among adults.
- Five studies revealed that flavors are a primary reason adults use e-cigarettes.
- Six studies showed that the role of flavored e-cigarettes on smoking cessation among adults is unclear, though one study among youth showed that youth who use flavored e-cigarettes were less likely to quit tobacco.

"Consistent evidence shows that flavors attract both youth and adults to use e-cigarettes," said Adam Goldstein, MD, MPH, professor of family medicine and member of the UNC Lineberger Comprehensive Cancer Center. "Given the fact that nicotine is highly addictive and can affect brain development—as well as these clear findings that the impact of flavors on youth is strong and consistent, we believe that banning non-menthol flavors in e-cigarettes will help reduce the epidemic of youth e-cigarette use."

Most e-cigarettes contain nicotine, and most include at least one of about 7,000 e-cigarette flavors available for purchase, such as blueberry

cheesecake, mango, cinnamon, sweet milk, and lemon crumble cake. Many flavors have candy or sweet names, such as gummy bear, cookies 'n cream, and cotton candy, that appeal more to younger e-cigarette users. Studies over the past five years have shown a steady rise in vaping among youth, and a 2019 study showed that about 28 percent of U.S. youth are current e-cigarette users.

Lead author Hannah Baker, MPH, research associate in the UNC Department of Family Medicine and UNC Lineberger, said, "Many studies we reviewed showed that flavors were particularly appealing to youth and cited as a primary reason for use among this age group. The use of e-cigarettes among youth may be a gateway to future cigarette use, and nicotine is especially harmful to developing adolescent brains. These facts, along with biomedical research linking vaping to multiple adverse health effects, make the recent precipitous increase in e-cigarette use among youth particularly alarming."

Baker added, "Our synthesis of evidence regarding the role of non-menthol flavors in e-cigarettes on product perceptions and use is particularly relevant to the FDA's recently proposed policy framework that seeks to place additional regulations on the sale of non-menthol-flavored e-cigarettes to youth."

This new BMJ Open review significantly expands earlier findings about e-cigarettes and flavors. The researchers' previous review showed initial evidence that flavors in e-cigarettes were primary reasons for willingness to try or use the products. This expanded systematic review includes emerging longitudinal data and adds evidence regarding the expanded role of flavors in e-cigarettes, particularly among youth.

"Among [youth](#), flavors increase not only preferences for e-cigarettes but they also increase e-cigarette product appeal, willingness to use, susceptibility to use and initiation, as well as decrease e-cigarette product

harm perceptions," Goldstein said. "Among adults, the expanded research now shows that e-cigarette flavors also increase product appeal and enjoyment."

**More information:** Clare Meernik et al. Impact of non-menthol flavours in e-cigarettes on perceptions and use: an updated systematic review, *BMJ Open* (2019). [DOI: 10.1136/bmjopen-2019-031598](https://doi.org/10.1136/bmjopen-2019-031598)

Provided by University of North Carolina Health Care

Citation: E-cigarette flavors decrease perception of harm among youth (2019, October 24)  
retrieved 7 May 2024 from  
<https://medicalxpress.com/news/2019-10-e-cigarette-flavors-decrease-perception-youth.html>

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