Social media posts that promote tobacco are increasing, AI detection technology finds

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When teenagers and young adults see pro-tobacco content on social media, they face higher risks. They are more likely to report using tobacco products such as e-cigarettes (also called vapes), more likely to

start using those products for the first time and less likely to view them as harmful.

Algorithms programmed to automatically remove tobacco ads are designed to protect youth—but they don't always work or are not implemented well enough by social media platforms, according to Julia Vassey, MPH, a health behavior researcher in the department of population and public health sciences at the Keck School of Medicine of USC.

"Posts that promote tobacco are prohibited by platforms like TikTok and Meta, but studies show that only a small portion of that content gets removed," said Vassey.

A new study led by Vassey and Harvard Medical School researcher Chris J. Kennedy, Ph.D., used a form of artificial intelligence (AI) known as computer vision to track the prevalence of various tobacco-related objects on social media, finding that some content increased as much as 100% between 2019 and 2022.

The results were just published in the journal *Nicotine & Tobacco Research*.

While previous computer vision studies that analyzed e-cigarettes in social media posts looked broadly at e-cigarette-related content (including user-generated and promotional content), the present study is the first to focus specifically on influencer posts on TikTok, Vassey said.

The work is part of the Keck School of Medicine's Tobacco Center on Regulatory Science (TCORS), one of seven centers in the country that conduct research specifically to inform federal policy related to tobacco.

An increase in prevalence

Vassey and her colleagues, who are based at USC, Harvard Medical School and Dartmouth College, started by building a computer vision model, which uses AI to identify specific features in visual data, such as photos or videos. Using a dataset of 6,999 images from Instagram, they trained the algorithm to recognize objects related to e-cigarette use.

The model was trained to differentiate between objects in eight different categories: mod or pod devices, e-juice containers, packaging boxes, nicotine warning labels, e-juice flavors, e-cigarette brand names and smoke clouds. By training the model to distinguish between various types of tobacco content, the researchers are able to drill down into the specific types of e-cigarette products being promoted.

Once the model was trained to recognize tobacco-related objects, Vassey and her team used it to analyze 14,072 TikTok videos posted from "micro-influencers." These users have between 1,000 and 100,000 followers and get a high number of likes and comments on their posts.

The researchers found that the prevalence of pod devices increased by 33% between 2021 and 2022, while the prevalence of e-juice flavor names and e-cigarette brand names increased by about 100% between 2019 and 2022. Nicotine warning labels also increased in prevalence over time, showing up in 3% of TikTok videos analyzed from 2019 and 9% of videos analyzed from 2022.

Research to help protect youth

In addition to these findings, the study offers insights about the most effective way to study tobacco content on social media moving forward. While human reviewers tend to find tobacco-related objects with higher accuracy than computers, an AI algorithm can process much larger datasets. A larger sample size or an improved model architecture can

help offset slightly lower accuracy rates, pointing to computer vision as a promising tool to review the ever-growing pool of social media content.

The researchers have also publicly shared their model, code and training dataset for students and researchers to download and use on their own datasets. Other users can even retrain the model to fit their needs, for example to recognize cigarettes, cigars or other types of tobacco products.

TCORS researchers will continue studying the effects of e-cigarettes on youth, including more research on the growing role of social media content.

"We know that this content is growing, not disappearing," Vassey said. "That tells us there's a need for continued research on the presence and the effects of this marketing."

More information: Julia Vassey et al, Scalable surveillance of e-cigarette products on Instagram and TikTok using computer vision, *Nicotine and Tobacco Research* (2023). DOI: 10.1093/ntr/ntad224

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