PERSPECTIVE AND INSIGHT

Preventing vaping among Chinese youth in the digital age: Leveraging artificial intelligence to curb latent risks

Xibin Sun[1,2], Yang Wang[2,3,*]

[1]School of Public Health, Peking University, Beijing 100191, China
[2]China Center for Health Development Studies, Peking University, Beijing 100191, China
[3]Faculty of Health and Wellness, City University of Macau, Macau 999078, China

The World Health Organization has stated that the electronic cigarette (e-cigarette) industry relentlessly targets young generations, resulting in a dramatic global rise in the prevalence. In China, recently-released national estimates indicate that 2.4% of secondary school students were current users and 13.5% were ever users in 2023, which were 1.2 and 2.6 percentage points lower than in 2021, respectively (CCTV News, 2024; Yang, 2024). These trends may be attributed to the fact that the Chinese government has officially banned non-tobacco flavored e-cigarette products and online sales, especially through major e-commerce platforms, within the past few years. However, these actions do not seem to be as effective as expected. It has been reported that illegal e-cigarette products, such as "milk tea cups" and " cola cans", remain widely accessible to minors, with online sales still prevalent (Wang *et al.*, 2025). This suggests that the expanding e-cigarette market still poses a significant threat to youth health in China. The digital age perpetuates online marketing and unrestricted sales of e-cigarettes, increasing the likelihood of experimented use among youth.

Despite the great regulatory efforts to protect minors, they can still manage to purchase e-cigarettes online through various channels due to incomplete enforcements. Although searching the exact keyword "e-cigarette" on e-commerce platforms often fails to generate a list of relevant products, simply using homonyms or terms such as "e-cigarette accessories" instead and then communicating with online customer service representatives will likely lead to successful transactions. In addition, posts on social media platforms also function to divert viewers to purchase channels. For examples, a great number of colorful photos of e-cigarettes posted on popular social review sites in China, often include watermarks with contact information. On well-known domestic Q&A forums, published questions related to e-cigarette use experiences may lead to threads with external links for sales (Lu, 2023). These transactions, facilitated by private messages , largely do not verify buyer age and often involve illegal e-cigarette products containing unknown ingredients that are particularly harmful to adolescents (Wang *et al.*, 2025). After receiving payments from buyers through messaging apps, retailers will discreetly ship out the ordered products *via* courier delivery services typically without any restrictions. Thus, it is extremely difficult to eradicate purchases by minors through Internet.

Great exposure to e-cigarette-related online information increases the likelihood of use among adolescents who have never used e-cigarettes (Camenga et al., 2018). They regularly browse social media and thus inevitably expose themselves to soft sell advertising of e-cigarettes on the platforms. Unboxing and evaluation videos, mainly on product flavors, appearance design and battery life, account for the largest proportion of vape-related contents on one of the most active online video-sharing and livestreaming communities in China,

***Corresponding Author:**
Yang Wang, China Center for Health Development Studies, Peking University, 38 Xueyuan Road, Haidian District, Beijing 100191, China; E-mail: yang.wang@hsc.pku.edu.cn; http://orcid.org/0000-0002-5632-1909
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followed by vape tricks and product component modifications (Xie, 2023). Attracting the attention of young viewers, they often lack warnings for minors and spread misleading information on vape products, such as harmlessness and smoking cessation function. What is worse, the platforms develop algorithms that push relevant videos based on viewers' browsing history, which could make teenagers repeatedly exposed to vape-related contents. This largely shapes the market and contributes to the development of pro-vaping subculture . The prevalence of online misleading information significantly raises the difficulty of curbing youth vaping in China.

Considering the overall impact of the internet on youth e-cigarette use in China, we call for further actions to prevent minors from experimenting with the products in this digital era, including reducing both online transactions and information exposure, prohibiting underage purchases, and designing effective health education curricula. Specifically, advanced artificial intelligence technologies can be applied to efficiently detect and remove hidden purchase channels and misleading information on the Internet by leveraging natural language processing and image recognition technologies. Content creators on social media platforms should be mandated to attach noticeable warning signs for use to vaping-related posts. Schools and parents should be responsible for improving internet and social media literacy among adolescents, allowing them to critically analyze the massive amount of online health information. In addition, public health sectors can also take advantage of machine learning algorithms to identify younger viewers on social media platforms and push them health education videos on e-cigarettes.

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YW conceptualized the study, critically reviewed and revised the manuscript. XS wrote the first draft of the manuscript.

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No additional data..

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