

Lesson 2: The Science of Nicotine

Use the information below to decide the pros and cons of vaping from the perspective of your given profile:

“Health authorities [in the UK] are actively courting the vape industry in an effort to cut smoking rates”¹

E-cigarette use can have negative effects on **respiratory** health (anything to do with the lungs and breathing). Research has shown that young people using e-cigarettes are twice as likely to suffer from a chronic cough than non-users. Vaping can reduce the function of the lungs via disturbance of gas exchange and tissue inflammation. It can also lower immunity, increasing the risk of respiratory infection.²

Prolonged nicotine exposure can impact brain development. This can contribute to cognitive and attention deficit conditions and worsen mood disorders³

A study in South Korea found that e-cigarette use was significantly associated with gum disease and that vaping may not be a safe alternative to smoking for oral health.⁴

The Cochrane Library found that people are more likely to stop smoking for at least six months using nicotine e-cigarettes, or ‘vapes’, than using nicotine replacement therapies, such as patches and gums.⁵

‘While the long-term effects of vaping are still unknown, the harmful effects of smoking are indisputable – smoking causes around 55,000 cancer deaths in the UK every year. Cancer Research UK supports balanced evidence-based regulation on e-cigarettes from UK governments which [...] help people stop smoking, whilst minimising the risk of uptake among others.’⁶

“E-cigarettes do not burn tobacco; and as such they do not expose users to the same complex mix of chemicals that cause diseases in people smoking conventional cigarettes. E-cigarettes are not risk free and shouldn’t be used by people who don’t smoke or aren’t at risk of smoking. However, evidence shows that nicotine e-cigarettes carry only a small fraction of the risk of smoking. In our review, we did not find evidence of substantial harms caused by nicotine containing electronic cigarettes when used to quit smoking. However, due to the small number of studies and lack of data on long-term nicotine-containing electronic cigarette usage – usage over more than two years – questions remain about long-term effects.”⁷

¹ <https://www.bbc.co.uk/programmes/articles/2sxWjgnyTBKfrlx7vbVnZHY/how-did-e-cigarettes-and-vaping-get-so-popular>

² <https://pubmed.ncbi.nlm.nih.gov/27806211/> and <https://physoc.onlinelibrary.wiley.com/doi/full/10.1113/JP279526>

³ <https://ijponline.biomedcentral.com/articles/10.1186/s13052-022-01286-7>

⁴ <https://aap.onlinelibrary.wiley.com/doi/10.1002/JPER.19-0060>

⁵ <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD010216.pub7/full>

⁶ Michelle Mitchell, Chief Executive, Cancer Research UK

⁷ Dr Nicola Lindson, University Research Lecturer at the University of Oxford, Cochrane Tobacco Addiction Group’s Managing Editor, and author of the publication: <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD010216.pub7/full>

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In a study that measures the levels of toxins and carcinogens in the urine of e-cigarette users versus cigarette smokers, levels of these compounds were much lower in e-cigarette users.⁸⁹

In most vapes, the fluid chamber is in the same location as the metallic heating element. These are called Cartomizer E-cigarettes. Studies have found the presence of metal and silicate particles in vapour from these devices.¹⁰

A study has found that e-cigarette vapours contain some toxic substances. The levels of the toxicants were 9–450 times lower than in cigarette smoke.¹¹

A study suggested that e-cigarettes may have contributed to an additional 50,000 long-term ex-smokers in England in 2017.¹²

Unlike tobacco smoke, there's not good evidence to suggest that second-hand e-cigarette vapour is dangerous to others.¹³

Vaping may also increase mucus production in lung cells, worsening asthma and causing airways to become more sensitive and constrict more easily.¹⁴

The brain keeps developing until about age 25. Some studies show that nicotine might harm the developing adolescent brain, though these studies have only been conducted on rats and any human studies have been confounded by the effects of smoking.¹⁵

People who smoke report spending £1,200 a year on cigarettes, while those who use e-cigarettes only spend £417 a year on those products, according to a new UCL study.¹⁶

Some people smoke or vape as 'self-medication' to ease feelings of stress. However, research has shown that smoking and vaping increases anxiety and tension. Nicotine creates an immediate sense of relaxation, so people believe it reduces stress and anxiety. This feeling is temporary and soon gives way to withdrawal symptoms and increased cravings.¹⁷

⁸⁹ <https://academic.oup.com/ntr/article-abstract/17/6/704/1043695/Evaluation-of-Toxicant-and-Carcinogen-Metabolites?redirectedFrom=fulltext>

⁹ <https://www.acpjournals.org/doi/10.7326/M16-1107>

¹⁰ <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0057987>

¹¹ <https://tobaccocontrol.bmj.com/content/23/2/133>

¹² <https://pubmed.ncbi.nlm.nih.gov/31621131/>

¹³ McNeill A, Brose LS, Calder R, et al. *Evidence review of e-cigarettes and heated tobacco products*. London: Public Health England; 2018.

¹⁴ <https://link.springer.com/article/10.1007/s11882-017-0747-5>

¹⁵ Taylor G, McNeill A, Girling A, et al. *Change in mental health after smoking cessation: systematic review and meta-analysis*. British Medical Journal 2014;348:g1151.

¹⁶ <https://onlinelibrary.wiley.com/doi/10.1111/add.14709>

¹⁷ <https://www.mentalhealth.org.uk/explore-mental-health/a-z-topics/smoking-and-mental-health#:~:text=However%2C%20research%20has%20shown%20that,withdrawal%20symptoms%20and%20increased%20cravings.>