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# The adverse effects of vaping in young people

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ABSTRACT

Vapes or e-cigarettes are battery operated devices that heat a liquid until it becomes a vapour, which is inhaled. Typically, e-liquids contain nicotine, different flavourings, and propylene glycol. Vaping devices are either disposable vapes or rechargeable. Vapes were initially developed as stop smoking aid but they have now become a recreational product popular among teenagers.

Vaping has increased at an alarming rate among teenagers and young adults in Ireland. The European Schools Project for Alcohol and Other Drugs (ESPAD) survey 2019 showed that almost 4 in 10 Irish 16-year-olds had tried vaping and 15 % currently use them. More worrying is the dramatic rise in the use of disposable vapes in recent years. An Action on Smoking and Health (ASH) UK survey data revealed a 9-fold increase from 2021 to 2023 in their use (7.7 % to 69 %) among 11–17-year-old vapers.

A combination of clever marketing by vaping companies, a strong social media presence, attractive flavours and easy accessibility has contributed to the increasing use of vapes by young people.

Exposure of children and adolescents to nicotine in vaping solutions can lead to long-term negative impacts on brain development, as well as addiction. Many teenagers who vape experience poor concentration, anxiety, mood disorders and sleep disturbance. A paper from NEJM in 2022 reported a case series where chronic vaping resulted in small airway fibrosis of the airways. A systematic review conducted in 2021 concluded that teenager vapers were three to five times more likely to take up tobacco smoking when compared with non-vapers.

Strong legislation is required to ban the sale of disposable vapes to teenagers along with controls on marketing online. Healthcare Professionals should ask and counsel their patients about vaping. Increased public awareness and education for Health care professionals on teenage vaping needs to be addressed.

Vaping has become a global public health issue that must be addressed urgently.

## Introduction

Vapes or e-cigarettes are battery operated devices that heat a liquid until it becomes a vapour, which is inhaled. Typically, e-liquids contain nicotine, different flavourings, and propylene glycol. Vaping devices are either disposable vapes or rechargeable ones. Vapes were initially developed as stop smoking aid but they have now become a recreational product popular among adolescents and young adults.

## How common is vaping among adolescents?

Numerous studies across many jurisdictions have reported the significant increase in the prevalence of teenage vaping over recent years. A recent meta-analysis involving 69 countries reported that ever and current vaping use among adolescents and young adults under 20 years of age was 17.2 % and 7.8 % respectively.[1] A European study described how more adolescents are now using vapes compared with smoking tobacco products.[2] A national survey of US high school students found that current vaping increased from 1.5 % in 2011 to 20.8 %[3]

It is clear that we are dealing with a significant global public health

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## Why has vaping become so popular with adolescents?

Euromonitor International has estimated that the e-cigarette market had quadrupled in value, from under US$5 billion in 2013 to more than US$20 billion in 2019.[4] Over this timeframe, there has been heavy investment in e-cigarette manufacturers by the tobacco industry.[5] Adolescents are being targeted by aggressive advertising and marketing campaigns akin to that produced by the tobacco industry at the mid-point of the 20th century. The advent of social media has provided a platform for e-cigarette companies to market their products to youth at an unprecedented level.[6]

The flavours and bright coloured packaging of vaping products are attracting adolescents to vaping. A Dutch study reported that there were over 20,000 different e-liquids and 250 flavoured vaping products available to buy on the market[7] and there is evidence that flavours promote youth vaping initiation.[8] Furthermore, the introduction of disposable vaping products to the market has resulted in a significant uptake in adolescent vaping. An Action on Smoking and Health (ASH) UK survey data revealed a 9-fold increase from 2021 to 2023 in their use (7.7 % to 69 %) among 11–17-year-old vapers.[9] A recent survey from Northern Ireland revealed that 86 % of 11–16-year-olds that use e-cigarettes stated that they use disposable vapes.[5] Disposable vapes have become the product of choice for adolescent vapers.

## What are the health effects of vaping?

While everyone agrees that vaping is less harmful than tobacco smoking, vaping is not a harmless activity. Firstly, does vaping help people quit smoking? The World Health Organisation (WHO), and international thoracic societies including the European Respiratory Society (ERS) and American Thoracic Society (ATS) have all stated that there is insufficient evidence to support the use of vaping as a quit smoking aid.[10] A systematic review published in 2021 examined ten randomised controlled trials and found there was no evidence that e-cigarettes were any better at helping smokers quit when compared to approved and regulated nicotine replacement therapy (NRT).[11] The evidence for vaping as a stop smoking tool is mixed at best and healthcare professionals should recommend evidence based smoking cessation methods rather than vaping where significant uncertainties lie.[12] In addition, approximately 40 % of e-cigarette users continue to smoke tobacco products.[13] Recent evidence suggests that dual use of e-cigarettes and tobacco smoking conferred a higher risk of disease to users compared with tobacco smoking alone.[14]

A number of studies to date have reported on the harmful effects of vaping. Nicotine, the major psychoactive component of vaping solution, can lead to long-term negative impacts on brain development, as well as addiction during adolescence.[15] Many teenagers who vape are at an increased risk of anxiety, mood disorders and sleep disturbance.[16] Studies examining the adverse effects of vaping on the respiratory system, such as COPD, asthma and bronchitis are growing in number.[17,18] A recent study examined a group of never tobacco smokers and reported that current e-cigarette use was associated with a 39 % higher odds of self-reported asthma compared with never e-cigarette users.[19] A paper from NEJM in 2022 reported a case series where chronic vaping resulted in small airway fibrosis and constrictive bronchiolitis of the airways.[20] The authors postulate that these findings could provide an explanation for the pathogenesis of lung disease in people who chronically vape. Recent systematic reviews have also highlighted concerns regarding the association between vaping and an increased risk of cardiovascular disease.[21] Apart from the detrimental health effects of vaping on the respiratory and cardiovascular systems, there is strong evidence that vaping can lead to tobacco smoking. A systematic review conducted in 2021 concluded that teenager vapers were three to five times more likely to take up tobacco smoking when compared with non-vapers.[22]

## How can we curb the explosion in teenage vaping?

Different countries around the world have taken various measures to decrease the prevalence of vaping among teenagers.[23] What is clear from the evidence is that further restrictions on the advertising, marketing and the point-of sale displays of vaping products need to be introduced. A ban on the sale of all vape flavourings apart from tobacco flavours would decrease the attraction of these products to children. A number of jurisdictions have introduced a ban on disposable vapes. Apart from being a popular product with adolescents, disposable vapes are also an environmental hazard. They contain a lithium battery, plastic, and copper wiring so their design is such that recycling will always be labour intensive and expensive, which is why it makes sense to ban them outright. It is likely that a combination of restrictions is needed to address this growing issue. Against the argument for more restrictions, vaping advocates often state that there is a danger that ex-smokers will go back to using tobacco products. However, none of the above restrictions would prevent access for smokers who wish to try vaping as a smoking cessation aid. The restrictions would most likely result less adolescents vaping which on a population level is far more beneficial in the long-term.

In addition to governments introducing legislative measures, paediatric healthcare professionals have a role to play in tackling teenage vaping. Healthcare Professionalss should be asking and counselling their adolescent patients about vaping as well as providing support for teenagers who wish to quit vaping. Vaping has become a global public health issue that must be addressed urgently. We are at risk of repeating the same mistakes of the past by allowing the tobacco industry to hook our youth onto their products. The potential long-term health impact of a new generation of nicotine addicted adolescents and young people need further study. But we had to wait many years for evidence to emerge on tobacco smoking. In the meantime, increased public awareness and education for on teenage vaping needs to be addressed.

## CRediT authorship contribution statement

**Judith Meehan:** Data curation, Project administration, Writing – review & editing. **Mairead Heffron:** Conceptualization, Data curation, Formal analysis, Project administration, Writing – original draft. **Helen Mc Avoy:** Conceptualization, Data curation, Formal analysis, Writing – original draft. **Ciara Reynolds:** Conceptualization, Data curation, Writing – review & editing. **Louise Kyne:** Conceptualization, Data curation, Formal analysis, Writing – original draft. **Des W Cox:** Conceptualization, Data curation, Formal analysis, Methodology, Supervision, Writing – original draft, Writing – review & editing.

## 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.

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