

CROSSTALK

Comments on CrossTalk 46: The benefits of e-cigarettes outweigh the harms/E-cigarettes expose users to adverse effects of vapours and the potential for nicotine addiction

E-cigarettes: friend or foe?

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The Crosstalk debate on e-cigarettes (Begh & Aveyard, 2020; Chung *et al.* 2020) highlights key tensions in public policy discussions surrounding harm reduction. On the one hand, Begh and Aveyard rightly point out that vaping is less harmful than smoking. Even without decades of epidemiological data, this makes sense since most harm from tobacco can be traced back to its mode of delivery via combustion. This leads to the formation of toxicants and carcinogens linked to cardiovascular, respiratory and neoplastic diseases, whereas there is no combustion in e-cigarettes, resulting in much lower exposure to harmful compounds (Shahab *et al.* 2017). Indeed, switching from cigarettes to more established non-combustible forms of tobacco such as snus has been linked to reductions in smoking-related diseases at population level (Foulds *et al.* 2003). On the other hand, Chung *et al.* correctly identify residual known risks associated with e-cigarette use and physiological changes with yet unknown health consequences. Further, while e-cigarettes aid smoking cessation, their use among never-smoking adolescents is increasing (Wang *et al.* 2019), which could have detrimental effects on youth smoking rates. In the end, however, harm reduction is not about risk elimination but about a utilitarian calculus: therefore, the best way to judge vaping is to model its net impact on society under varying assumptions. Such modelling produces reassuring results: even under pessimistic scenarios of risk reduction, impact on smoking uptake and cessation, e-cigarette use tends to reduce population mortality and morbidity (Levy *et al.* 2018), showcasing how uniquely harmful cigarettes are.

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Additional information

Competing interests

None declared.

Differences in regulatory policies may influence the e-cigarette safety analysis

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What may appear to be stark contrasts between the evaluations of e-cigarettes' harm/safety may simply be different analyses. Begh & Aveyard (2020) posits e-cigarette toxicity is lower than that of combustible cigarettes, and they

demonstrate that e-cigarettes show promise to decrease smoking among UK adults. Alternatively, Chung *et al.* (2020) highlight cardiorespiratory health effects of e-cigarette use and suggest they may cause more harm than harm reduction, based on findings that years of life lost from new smokers who initiate nicotine via e-cigarettes outweighs lives of current smokers they may save (Soneji *et al.* 2018). Despite declines in smoking rates among US youth/young adults, the rapid rise in e-cigarette use among this group is alarming because transitions from using e-cigarettes to cigarettes often occur among older young adults (e.g. 25–28 years) (Loukas *et al.* 2019). Further, e-cigarette toxicity may vary depending on tobacco control regulations. May 2014, European Parliament revised a Tobacco Product Directive (implemented 2016–2017) that included a maximum nicotine limit of 20 mg/ml per e-cigarette. Alternatively, given authority of e-cigarettes in 2016, the US Food and Drug Administration (FDA) grandfathered existing e-cigarettes into the market without examining product ingredients. In January 2020, the FDA's first regulation of e-cigarettes controversially singled out one product type by banning the sale of flavoured pod-mod devices, while nicotine concentrations of e-cigarettes sold in the USA were found to exceed 59 mg/ml (Talih *et al.* 2019). Perhaps other underlying factors should be considered within this debate including age groups and regulatory approaches that differ widely between countries.

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E-cigarettes: available evidence suggests that, so far, hypothetical harms have not materialised, while benefits are real and substantial

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Three issues determine the balance of harms and benefits of e-cigarettes (ECs): are they less risky than conventional cigarettes? Do they help smokers reduce or stop smoking? And do they attract non-smokers to smoking? Begh and Aveyard review the evidence that answers these questions unequivocally as yes, yes and no. Chung *et al.* claim otherwise, but the evidence they present does not address these points well.

Regarding EC safety, pointing out that ECs can be potentially harmful does not address the key question of whether a smoker would be better off vaping. Practically all the evidence that we have supports the emphatic yes answer (McNeill *et al.* 2018).

Regarding EC efficacy, several new randomised controlled trials confirm the results of the study that both commentaries discuss (Hatsukami *et al.* 2019; Holliday *et al.* 2019; Walker *et al.* 2020), as do epidemiological data (Brown *et al.* 2014).

Regarding smoking in adolescents, there is again no uncertainty there. Even in the USA, where experimentation with ECs is more common than elsewhere, smoking in adolescents is at an all-time low (Centers for Disease Control & Prevention, 2020).

If ECs pass these three tests, the reader may wonder why there is such a strong opposition to their use. It seems to be driven by a concern that if smokers and nicotine-seeking youth can use less harmful products, this will undermine the goal of eradicating nicotine use. This, however, is a moral rather than public health

objective. Nicotine on its own is not much more harmful than caffeine. To reduce the unnecessary disease and death caused by smoking, and do it faster than with any other approach tried so far, we need to encourage smokers to make the switch.

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Additional information

Competing interests

None declared.

E-cigarette regulations are necessary to protect youths and adolescents

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We agree with Begh and Aveyard (Begh & Aveyard, 2020) that e-cigarettes are less harmful than tobacco cigarettes as we have shown that vaping e-cigarettes did not influence subclinical markers of vascular functions in young healthy tobacco product-naïve participants (Cossio *et al.* 2020). However, we argue that e-cigarettes should not be promoted for smoking cessation unless there are appropriate regulations to prevent initiation and continuation by adolescents and young adults. Among the most critical regulations are those focused on e-cigarette marketing. Almost 80% of US adolescents reported exposure to e-cigarette marketing in 2016 (Marynak *et al.* 2018). E-cigarettes are promoted on venues that appeal to youth, such as on social media (Collins *et al.* 2019), and advertisements feature youth-appealing strategies, such as celebrity endorsements (Phua *et al.* 2018) and cartoon characters (Kirkpatrick *et al.* 2019). Not surprisingly, e-cigarette marketing exposure elevates risk for adolescent and young adult e-cigarette initiation and use (Loukas *et al.* 2019). Even more concerning is that e-cigarette advertising impacts youths' perceptions of cigarettes, with one study showing exposure to e-cigarette advertisements decreased adolescent non-smokers' perceptions regarding harms associated with cigarette smoking (Kim *et al.* 2019). Given the negative impact of e-cigarette marketing on e-cigarette use and on cigarette perceptions, we should not promote e-cigarettes as a cessation tool, unless we have appropriate e-cigarette regulations that protect those highly vulnerable to e-cigarette initiation and continuation, namely adolescents and young adults.

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Additional information

Competing interests

None declared.

The need for precision and balance when debating regulation for e-cigarettes

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The crosstalk article by Chung and colleagues reviews a number of interesting recent findings on the possible health impacts of e-cigarettes. However, the article also makes a number of overgeneralised claims and selectively highlights particular findings.

An example of an overgeneralised claim: 'widespread e-cigarette use is exposing a new generation of non-smokers to possible nicotine addiction and adverse health effects.' There is evidence from some countries – notably the USA – that

a growing proportion of young people use e-cigarettes. For example, in the US National Youth Tobacco Survey, past 30-day use of e-cigarettes in high-school students increased sharply from 11.7% in 2017 to 27.5% in 2019. However, widespread use by non-smokers is not a universal phenomenon, and even in the USA, the extent to which use translates to nicotine addiction is less clear, at least up to 2019: frequent (≥ 20 of past 30 days) use occurred in only 1.0% of never tobacco users in 2018 and 2.1% in 2019, while among past-30-day e-cigarette never tobacco users in 2019, only 8.7% reported craving and 2.9% reported wanting to use within 30 min of waking (Jarvis *et al.* 2018). It is important to continue monitoring these trends closely and formulate policy to minimise youth uptake, but it has to be proportionate to the problem and particular to the country.

An example of a selective claim: 'E-cigarettes may not necessarily be a "harm reduced" tobacco alternative, especially since quitting rates with vaping seem equal to smoking cessation attempts with nicotine replacement and medication therapy, but with a high continued vaping rate at 1 year (Hajek *et al.* 2019)'. The article by Hajek *et al.* does show that continued vaping was high (80%) at 1 year among those who had quit smoking. However, it does *not* show that quitting rates 'seem equal', as claimed. Instead, Hajek *et al.* specifically reported that e-cigarettes were substantially more effective (RR = 1.8) (Hajek *et al.* 2019). This is not a trivial difference especially because the control condition involved a highly effective means of quitting (nicotine replacement therapy (NRT) used under expert guidance with almost 90% using combination treatment). On the basis of those results, e-cigarettes were found to be highly cost-effective compared with NRT (Li *et al.* 2020). On the other hand, as Begh and Averyard point out in their crosstalk article, a Cochrane review from 2016 based on older studies found that e-cigarettes were about as effective as NRT. It may be the case that newer devices of the type studied by Hajek *et al.* (2019) are more effective. The next Cochrane review on the topic will be revealing and is eagerly awaited by the field.

It is my view that there has been a persistent misrepresentation of the evidence

on e-cigarettes and it is likely responsible for harmful policies, such as countries banning e-cigarettes while permitting the sale of the undeniably more toxic and lethal cigarettes. It is also the case that many smokers do not believe e-cigarettes are safer than cigarettes, and in some countries the situation is deteriorating. For example, approximately 65% of smokers in England believed e-cigarettes to be at least equally as harmful as cigarettes at the end of 2019, up from about 50% at the end of 2016 (Tattan-Birch *et al.* 2020). As argued by 38 experts from across tobacco control and public health in *The Lancet*, e-cigarettes have a role to play in reducing death from smoking but there is an urgent need for a more rational debate (Shahab *et al.* 2020). This requires a precise and balanced weighing of the evidence.

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Additional information

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