

# Standing Committee on Health, Aged Care and Sport Inquiry The Use and Marketing of Electronic Cigarettes and Personal Vaporisers in Australia

## Do vapour products reduce or increase smoking?

19 October 2017

Clive Bates, Colin Mendelsohn

## 1 Introduction

We wish to provide supplementary evidence on two contentious points recently raised in the context of the Committee's hearings:

1. Evidence that e-cigarettes are, or are not, a pathway to quitting cigarettes.
2. Evidence that e-cigarettes do, or do not, lead to the uptake of cigarette smoking.

We provide extensive evidence from the literature to support the argument that e-cigarettes are a pathway to quitting cigarettes and do not lead to an uptake of smoking at any significant scale, and therefore that the balance of public health interest is strongly in favour of the availability of e-cigarettes as an anti-smoking strategy.

## 2 Evidence that e-cigarettes are a pathway to quitting cigarettes

### 2.1 Population studies

Zhu S-H, Zhuang Y-L, Wong S, Cummins SE, Tedeschi GJ. E-cigarette use and associated changes in population smoking cessation: evidence from US current population surveys. *Bmj*. 2017;358:j3262. [\[link\]](#)

**Conclusion** *The substantial increase in e-cigarette use among US adult smokers was associated with a statistically significant increase in the smoking cessation rate at the population level. These findings need to be weighed carefully in regulatory policy making regarding e-cigarettes and in planning tobacco control interventions.*

Beard E, West R, Michie S, Brown J. Association between electronic cigarette use and changes in quit attempts, success of quit attempts, use of smoking cessation pharmacotherapy, and use of stop smoking services in England: time series analysis of population trends. *BMJ*. 2016;354:4645–4645. [\[link\]](#)

**Conclusion** *Changes in prevalence of e-cigarette use in England have been positively associated with the success rates of quit attempts.*

Farsalinos KE, Poulas K, Voudris V, Le Houezec J. Electronic cigarette use in the European Union: analysis of a representative sample of 27 460 Europeans from 28 countries. *Addiction*. 2016;111(11):2032-40 [\[link\]](#)

*Self-reports from a representative sample of 27,460 EU citizens*

*'Extrapolating to the whole EU population, an **estimated 6.1 million Europeans have quit smoking** with the use of e-cigarettes, while a further 9.2 million have reduced their smoking consumption'*

Action on Smoking and Health UK. Use of electronic cigarettes (vapourisers) among adults in Great Britain. Fact sheet. May 2017 [\[link\]](#)

*An estimated 2.9 million adults in Great Britain currently use e-cigarettes (vape). For the first time there are more ex-smokers (1.5 million) who use e-cigarettes than current smokers (1.3 million)'*

*The main reason given by ex-smokers who are currently vaping is to help them stop smoking while for current smokers the main reason is to reduce the amount they smoke'*

Zhuang YL, Cummins SE, J YS, Zhu SH. Long-term e-cigarette use and smoking cessation: a longitudinal study with US population. *Tob Control*. 2016;25(Suppl 1):i90-i5 [link]

*'Among those making a quit attempt, use of e-cigarettes as a cessation aid surpassed that of FDA-approved pharmacotherapy'.*

*'Long-term vapers (over 2 years) had a four times higher odds of quitting for 3 months than short-term users and non-users. (OR 4.1 CI 1.6 to 13.9)'*

## 2.2 Longitudinal studies

Giovenco DP, Delnevo CD. Prevalence of population smoking cessation by electronic cigarette use status in a national sample of recent smokers. *Addict Behav*. Pergamon; 2018 Jan 1;76:129–34. [link]

- *Over half of daily e-cig users in the sample quit smoking in the last 5 years.*
- *Daily e-cig users were 3 times more likely to be quit than never e-cig users.*
- *Some day e-cig users were least likely to be quit.*
- *Some smokers may have quit or are preventing relapse with frequent e-cig use*

Biener L, Hargraves JL. A longitudinal study of electronic cigarette use among a population-based sample of adult smokers: association with smoking cessation and motivation to quit. *Nicotine Tob Res*. 2015;17(2):127-33 [link]

*Daily use of electronic cigarettes for at least 1 month is strongly associated with quitting smoking at follow-up' 'intensive users of e-cigarettes were 6 times more likely than non-users/tryers to report that they quit smoking (OR: 6.07, 95% CI = 1.11, 33.2)*

Hitchman SC, Brose LS, Brown J, Robson D, McNeill A. Associations Between E-Cigarette Type, Frequency of Use, and Quitting Smoking: Findings From a Longitudinal Online Panel Survey in Great Britain. *Nicotine Tob Res*. 2015;17(10):1187-94 [link]

*Online longitudinal survey of 1643 current users: daily tank users were more likely to have quit*

Mantey DS, Cooper MR, Loukas A, Perry CL. E-cigarette Use and Cigarette Smoking Cessation among Texas College Students. *Am J Health Behav* 2017 [link]

*Use of e-cigarettes for cigarette smoking cessation was associated with increased odds of cigarette smoking cessation at 6- and 12-month follow-ups*

## 2.3 Cross sectional studies

Brown J, Beard E, Kotz D, Michie S, West R. Real-world effectiveness of e-cigarettes when used to aid smoking cessation: a cross-sectional population study. *Addiction*. 2014 Sep 1;109(9):1531–40. [link]

**Conclusions.** *Among smokers who have attempted to stop without professional support, those who use e-cigarettes are more likely to report continued abstinence than those who used a licensed NRT product bought over-the-counter or no aid to cessation. This difference persists after adjusting for a range of smoker characteristics such as nicotine dependence.*

*The adjusted odds of non-smoking in users of e-cigarettes were 1.63 (95% CI = 1.17–2.27) times higher compared with users of NRT bought over-the-counter'*

## 2.4 Randomised controlled trials

Hartmann-Boyce J, McRobbie H, Bullen C, Begh R, Stead LF, Hajek P. Electronic cigarettes for smoking cessation. *Cochrane Database of Systematic Reviews* 2016, Issue 9. Art. No.: CD010216.. [link]

**Conclusions.** *There is evidence from two trials that ECs help smokers to stop smoking in the long term compared with placebo ECs. However, the small number of trials, low event rates and wide confidence intervals around the estimates mean that our confidence in the result is rated 'low' by GRADE standards.*

## 2.5 Reviews

Royal College of Physicians (London) *Nicotine without smoke. Tobacco Harm Reduction.* 2016 [\[link\]](#)

*E-cigarettes appear to be effective when used by smokers as an aid to quitting smoking.*

Public Health England. *E-cigarettes - an evidence update.* August 2015 [\[link\]](#)

*Recent studies support the Cochrane Review findings that EC can help people to quit smoking and reduce their cigarette consumption. There is also evidence that EC can encourage quitting or cigarette consumption reduction even among those not intending to quit or rejecting other support. More research is needed in this area'*

Clearing the Air Evidence: A systematic review on the harms and benefits of e-cigarettes and vapour devices Review Monograph, Uni Victoria, Canada - 18 Jan 2017 [\[link\]](#)

*Overall, there is encouraging evidence that vapour devices can be at least as effective as other nicotine replacements as aids to help tobacco smokers quit.*

United Kingdom Centre for Tobacco and Alcohol Studies. *Commentary on WHO report on electronic nicotine delivery systems [etc.].* 2016 [\[link\]](#)

*'Taking the totality of evidence including controlled trials, observational studies, changes in population smoking and ENDS use, the experience of nicotine replacement therapy, and widely reported user experience, there is confidence that ENDS are helping many smokers to quit smoking and not having negative effects'*

Glasser A. M., Collins L., Pearson J. L., Abudayyeh H., Niaura R. S., Abrams D. B. et al. *Overview of electronic nicotine delivery systems: a systematic review.* *Am J Prev Med* 2017; 52: e33–66. [\[link\]](#)

*RCTs and population-based studies with more-precise exposure measures show that ENDS are at least as effective as NRT in helping some smokers to quit or reduce their smoking and may reach more smokers at scale than NRT'*

## 2.6 UK data

*Towards a Smokefree Generation. A Tobacco Control Plan for England. 2017-2022.* Dept Health UK July 2017 [\[link\]](#)

*In 2016 it was estimated that 2 million consumers in England had used these products and completely stopped smoking and a further 470,000 were using them as an aid to stop smoking'.*

## 2.7 Critique of widely circulated Kalkhoran & Glantz meta-analysis

Kalkhoran S., Glantz S. A. *E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis.* *Lancet Respir Med* 2016; 4: 116–28. [\[link\]](#)

*38 studies (of 577 studies identified) were included in the systematic review; all 20 studies with control groups (15 cohort studies, three cross-sectional studies, and two clinical trials) were included in random effects meta-analysis and sensitivity analyses. Odds of quitting cigarettes were 28% lower in those who used e-cigarettes compared with those who did not use e-cigarettes [...] As currently being used, e-cigarettes are associated with significantly less quitting among smokers.*

Villanti AC, Feirman SP, Niaura RS, Pearson JL, Glasser AM, Collins LK, et al. How do we determine the impact of e-cigarettes on cigarette smoking cessation or reduction? Review and recommendations for answering the research question with scientific rigor. *Addiction*. 2017 Oct 3; [\[link\]](#)

*Only a small proportion of studies seeking to address the effect of e-cigarettes on smoking cessation or reduction meet a set of proposed quality standards. Those that do are consistent with randomized controlled trial evidence in suggesting that e-cigarettes can help with smoking cessation or reduction.*

*The Cochrane Handbook warns: 'meta-analyses of studies that are at risk of bias may be seriously misleading. If bias is present in each (or some) of the individual studies, meta-analysis will simply compound the errors, and produce a 'wrong' result that may be interpreted as having more credibility'*

Hajek P, McRobbie H, Bullen C. E-cigarettes and smoking cessation. *Lancet Respir Med*. Elsevier; 2016 Jun 1;4(6):e23. [\[link\]](#)

*There are several serious problems with the analysis, but the most glaring is its reliance on studies that enrolled people who smoke, then asked if they had used e-cigarettes. Some 20% of smokers who use e-cigarettes stop smoking altogether,<sup>2</sup> with similar or higher rates in cohorts of smokers who initially had no interest in quitting.<sup>3, 4</sup> In a study of UK stop smoking services, smokers quitting with e-cigarettes have higher quit rates than those using other treatments.<sup>5</sup> However in the studies that form the core of Kalkhoran and Glantz's meta-analysis, all these successful quitters were excluded. Smokers helped by e-cigarettes have left this population (because they gave up smoking) and only those not helped have remained. Such studies say nothing useful about e-cigarettes' efficacy other than that they don't help everyone, but their results can be misrepresented as showing that e-cigarettes undermine quitting. The report dismissed this problem as being addressed by the sensitivity analysis,<sup>6</sup> but that is not the case. If studies with serious selection bias were removed from the analysis, the results would be very different.*

Expert reaction to publication of Kalkhoran & Glantz Meta-analysis Science Media Centre, 14 January 2016 [\[link\]](#)

- Professor Peter Hajek, Director of the Tobacco Dependence Research Unit, Queen Mary University of London

*This review is grossly misleading in my opinion. There are several problems with the way studies were selected and used, but the main flaw is simple, though not easy to spot. The studies that are presented as showing that vaping does not help people quit only recruited people who were currently smoking and asked them if they used e-cigarettes in the past. This means that people who used e-cigarettes and stopped smoking were excluded.*

- Professor Robert West, Professor of Health Psychology, University College London, Editor of *Addiction*.

*Publication of this study represents a major failure of the peer review system in this journal.*

### 3 Evidence that e-cigarettes do not lead to an uptake of cigarette smoking

#### 3.1 Adolescents and 'gateway' effects

Bauld L. Young People's Use of E-Cigarettes across the United Kingdom Findings from Five Surveys 2015–2017. *IJERPH* 2017 [\[link\]](#)

- *Of 11-16 year olds in the UK (n>60,000) 'only 3% or less report using them at least weekly, most of whom are regular smokers, with **less than 0.5%** of never smokers reporting weekly e-cigarette use'*
- *Professor Linda Bauld: 'Our analysis of the latest surveys from all parts of the United Kingdom, involving thousands of teenagers shows clearly that for those teens who don't smoke, e-cig experimentation is simply not translating into regular use'*

Polosa R. A critique of the U.S. SG's conclusions regarding e-cig use among youth and young adults in US. Harm Red J 2017 [\[link\]](#)

*Multiple years of nationally representative surveys indicate the majority of e-cigarette use among US youth is either infrequent or experimental, and negligible among never-smoking youth' In the two large national studies, regular e-cigarette use by never smokers was <0.1% (NYTS 2015) and 0.7% (MTF 2014)*

Kozlowski LT, Warner KE. Adolescents and e-cigarettes: Objects of concern may appear larger than they are. Drug Alcohol Depend. 2017 May;174(1 May 2017):209–14. [\[link\]](#)[\[PDF\]](#)

*The data from large national cross-sectional studies provide no evidence that kids' use of e-cigarettes is increasing smoking. If anything, those data suggest the opposite.*

*We conclude, currently, that youth use of e-cigarettes is unlikely to increase the ranks of future cigarette smokers.'*

Clearing the Air: a systematic review on the harms and benefits of e-cigarettes and vapour devices. University of Victoria, Centre for Addictions Research BC, Canada. January 2017 [\[link\]](#)

Comprehensive review of 1,622 journal articles concluding that:

*There is no evidence of any gateway effect whereby youth who experiment with vapour devices are, as a result, more likely to take up tobacco use.*

Etter JF. Gateway effects and electronic cigarettes. Addiction 2017 [\[link\]](#)

*The gateway hypothesis cannot currently be either accepted or confidently refuted because the evidence for it is scarce and inconclusive.*

*In fact, it is more plausible that vaping uptake is largely explained because smoking causes people who are already dependent upon nicotine to look for less dangerous, more socially acceptable and cheaper ways to obtain nicotine*

ASH Youth Survey 2017 GB (prepublication)

*Regular use of e-cigarettes (at least weekly) was reported by **0.1% of never-smokers***

*Ever use of e-cigarettes was reported by 4% of never-smokers*

Glasser AM Overview of Electronic Nicotine Delivery Systems. Am J Prev Med 2017. [\[link\]](#)

Systematic review of 687 articles by The Schroeder Institute for Tobacco Research and Policy Studies at Truth Initiative

*ENDS uptake trends have coincided with significant reductions in smoking prevalence to record lows among youth and adults.'*

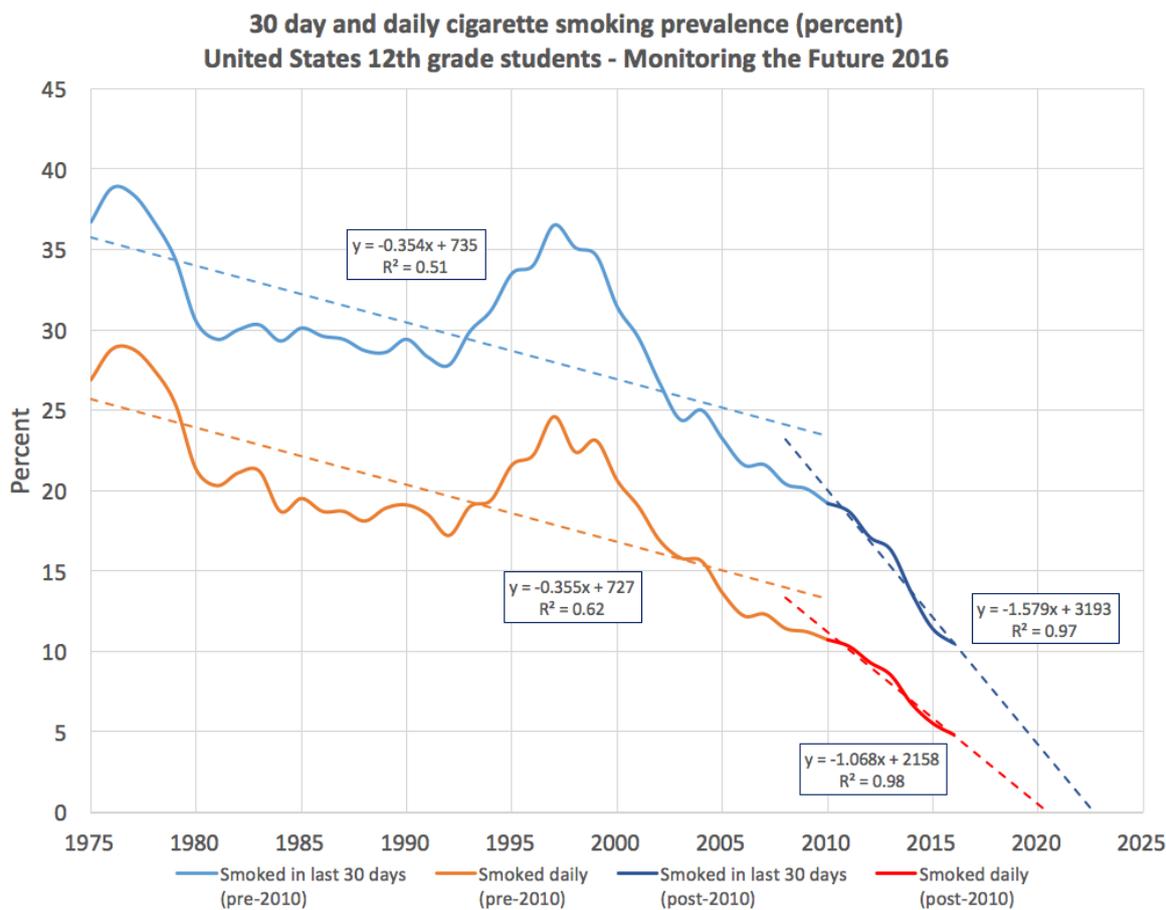
Selya AS. Evaluating the mutual pathways among electronic cigarette use, conventional smoking and nicotine dependence. Addiction 2017 [\[link\]](#)

Longitudinal study over 4 years of young adults 19-23y (n=1,007)

- *E-cigarettes did not predict later smoking or later nicotine dependence*
- *the current study calls into question the concerns that e-cigarettes pose a risk for later conventional smoking*
- *Increased initiation with e-cigarettes may be replacing, rather than adding to, initiation with conventional cigarettes*

Monitoring the Future Survey, National Institute of Drug Abuse 2016

Miech RA, Johnston LD, O’Malley PM, Bachman JG, Schulenberg JE. Monitoring the Future national survey results on drug use, 1975-2016: Data tables. Table 2 - Trends in Prevalence of Use of Cigarettes in Grades 8, 10, and 12. University of Michigan; Ann Arbor: 2016. [Tables][Dataset]. Chart created by Clive Bate [on-line]



### 3.2 Adults

Farsalinos K et al. Prevalence and correlates of current daily use of electronic cigarettes in the European Union: analysis of the 2014 Eurobarometer survey. Intern Emerg Med 2017 [link]

Eurobarometer survey of 27 460 Europeans from 28 countries

*‘Minimal current daily (0.08%, 95% CI 0.03–0.12%) and current daily nicotine-containing EC use (0.04%, 95% CI 0.01–0.08%) was observed among never smokers’.*

Eichler M. The Use of E-Cigarettes. A Population-Based Cross-Sectional Survey of 4002 Individuals in 2016. Dtsch Arztebl Int. 2016 [link]

*In Germany, only 0.1% of adult never smokers used e-cigarettes at the time of the survey.*

Delnevo CD. Patterns of Electronic Cigarette Use Among Adults in the United States. Nicotine Tob Res 2015 [link]

**Results:** *Current e-cigarette use is extremely low among never cigarette smokers (0.4%)*

**Conclusions:** *Extremely low e-cigarette use among never-smokers and longer term former smokers suggest that e-cigarettes neither promote widespread initiation nor relapse among adults.*

Schoenborn CA. Electronic Cigarette Use Among Adults: United States, 2014. NCHS Data Brief, US DHHS no 217, Oct 2015 [\[link\]](#)

*0.4% of adults who had never smoked cigarettes used e-cigarettes*

Zhu S-H, Zhuang Y-L, Wong S, Cummins SE, Tedeschi GJ. E-cigarette use and associated changes in population smoking cessation: evidence from US current population surveys. *Bmj.* 2017;358:j3262. [\[link\]](#)

Current population survey-Tobacco Use 2014-2015 (US national survey 18y+)

*‘Only 0.3% of never smokers currently used e-cigarettes at the time of survey (fig 3)*

West R, Brown J. Trends in smoking and e-cig use in England. Smoking Toolkit Study. 30/9/17 [\[link\]](#)

*Current e-cigarette use by adult never-smokers is 0.3%. negligible (fig 3)*

Office for National Statistics. E-cigarette use in England 2016 [\[link\]](#)

*0.7% of never smokers were self-reported current e-cigarette users (Table 2b)*

Action on Smoking and Health UK. Use of electronic cigarettes (vapourisers) among adults in Great Britain. Fact sheet. May 2017 [\[link\]](#)

*0.3% of adult never smokers in Great Britain were current e-cigarette users in 2017*

### 3.3 Methods problems – gateway effects

Phillips C V. Gateway Effects: Why the Cited Evidence Does Not Support Their Existence for Low-Risk Tobacco Products (and What Evidence Would). *Int J Environ Res Public Health* 2015;12:5439–64. [\[link\]](#)

*It is often claimed that low-risk drugs still create harm because of “gateway effects”, in which they cause the use of a high-risk alternative. Such claims are popular among opponents of tobacco harm reduction, claiming that low-risk tobacco products (e.g., e-cigarettes, smokeless tobacco) cause people to start smoking, sometimes backed by empirical studies that ostensibly support the claim. However, these studies consistently ignore the obvious alternative causal pathways, particularly that observed associations might represent causation in the opposite direction (smoking causes people to seek low-risk alternatives) or confounding (the same individual characteristics increase the chance of using any tobacco product).*

Gartner CE. E-cigarettes and youth smoking: be alert but not alarmed. *Tob Control*; 2017 Sep 8;tobaccocontrol-2017-054002. [\[link\]](#)

*Fears that an increase in vaping will lead to an increase in smoking among young people via a ‘gateway’ effect have been used to support greater regulation of vaping products or to advocate for continued prohibition of vaping products containing nicotine in countries that do not allow their sale, possession or use by adults. Are these reasonable responses to these research findings?*

*Several things should be considered in the interpretation of these studies.*

1. *A proportion of the young people who try vaping and then smoking would have also tried smoking without trying vaping due to a common liability to experiment with substance use.*
2. *It is plausible that vaping may increase the likelihood of experimenting with smoking through increased familiarity with a behaviour that resembles smoking and/or curiosity about how the two experiences compare. But it is unknown how many of those who might try smoking who would not have done so without trying vaping first will then go on to become regular smokers.*
3. *The baseline waves of these longitudinal studies were conducted in locations and at times when there were no age restrictions on sales of vaping products. In such a regulatory context, it is not surprising that young people may have tried the product with less restrictions first. This pattern may change as 18+ age restrictions are adopted in more jurisdictions.*
4. *The absolute number of young people regularly vaping or smoking remains low and appears to be decreasing.*

McNeill A, Brose LS, Calder R, *et al.* E-cigarettes: An Evidence Update. A Report Commissioned by Public Health England. London: 2015. [\[link\]](#) Section 4 Gateway page 37

*Since EC were introduced to the market, smoking prevalence among adults and youth has declined. Hence there is no evidence to date that EC are renormalising smoking, instead it's possible that their presence has contributed to further declines in smoking, or denormalisation of smoking. The gateway theory is ill defined and we suggest its use be abandoned until it is clear how it can be tested in this field. Whilst never smokers are experimenting with EC, the vast majority of youth who regularly use EC are smokers. Regular EC use in youth is rare.*

## About the authors

**Clive Bates** is director of Counterfactual, a consulting and advocacy practice focused on a pragmatic approach to sustainable development, energy policy and public health that he founded in 2013. From 1997 to 2003, he was the United Kingdom's director of Action on Smoking and Health, campaigning to reduce the harms caused by tobacco. From 2003 to 2013 he was a senior civil servant in the UK and for the UN in Sudan on unrelated business. Clive Bates and Counterfactual have no competing interests with respect to e-cigarette, tobacco or pharmaceutical industries.

**Colin Mendelsohn** is a Tobacco Treatment Specialist. He helps smokers to quit smoking, teaches health professionals, writes articles on smoking and is involved in a range of other smoking-related projects. He is an Associate Professor in the School of Public Health and Community Medicine at the University of New South Wales, where he teaches medical and Masters students. He also conducts training for health professionals around Australia. He is a member of the committee that develops the Australian national smoking cessation guidelines and is past Vice President of the Australian Association of Smoking Cessation Professionals, Australia's peak body for experts in the field of smoking cessation.