

THE UK ELECTRONIC CIGARETTE RESEARCH FORUM

cruk.org

UNIVERSITY of STIRLING



UKCTAS
UK Centre for Tobacco & Alcohol Studies



CANCER RESEARCH UK

Electronic Cigarette Research Briefing – April and May 2016

This research briefing is part of a series of monthly updates aiming to provide an overview of new studies on electronic cigarettes. This time we've combined papers from April and May. These briefings are intended for researchers, policy makers, health professionals and others who may not have time to keep up to date with new findings and would like to access a summary that goes beyond the study abstract. The briefing also aims to provide a critical overview of individual studies and put them in the context of what we already know from previous research.

The studies selected in these briefings do not form an exhaustive list of every e-cigarette-related study published each month. Instead they include those most relevant to key themes identified by the newly formed UK Electronic Cigarette Research Forum. This includes mechanisms and safety, cessation, population level impact, marketing and unintended consequences. For an explanation of the search strategy used, please see the end of this briefing.

The text below provides an overview of the aims, key findings and limitations of each of the highlighted studies. The briefing concludes with a section that puts the study findings in the context of the wider literature and what we know about existing research gaps.

If you would prefer not to receive this briefing in future, just let us know.

This month we'd also like to highlight the [Royal College of Physicians harm reduction report](#) and [new ASH e-cigarette data](#).

1. [Electronic Cigarettes for Smoking Cessation: A Systematic Review](#).

- **Study aims**

This Canadian systematic review synthesises the peer-reviewed and grey literature on e-cigarettes and smoking cessation, reduction and alleviation of withdrawal symptoms and urges to smoke. The 62 identified studies were evaluated through two stages of quality assessment.

- **Key findings**

The majority of moderate to strong rated studies on smoking cessation or reduction with e-cigarettes found a positive association (11 of 14 studies) but evidence remains weak and inconclusive because of the lack of high quality evidence. Studies were not combined due to the heterogeneity of outcome measures and methodological approaches. 31 studies were excluded as the quality was rated as weak due to methodological issues (e.g. small sample

sizes, no statistic testing, poor sampling techniques and failing to adjust for confounders) or outcome measures less than 30 days.

Nine of the ten moderate to strong studies suggested e-cigarettes may be useful in alleviating withdrawal symptoms and reducing urges to smoke but the overall quality of evidence was rated low.

- **Limitations**

The review is limited by the studies available for review and overall evidence quality was rated low due to the absence of a body of large carefully designed studies.

Malas M, van der Tempel J, Schwartz R, Minichiello A, Lightfoot C, Noormohamed A, Andrews J, Zawertailo L, Ferrence R. Electronic Cigarettes for Smoking Cessation: A Systematic Review. *Nicotine Tob Res.* 2016 Apr 25. pii: ntw119. doi:10.1093/ntr/ntw119

2. [The Potential That Electronic Nicotine Delivery Systems Can be a Disruptive Technology: Results From a National Survey.](#)

- **Study aims**

This US survey asked 5,717 adults about smoking and e-cigarette use, motivations and perceptions to explore whether e-cigarettes are a satisfying alternative to smoking. 729 ever e-cigarette users were split into current smokers no longer using e-cigarettes (rejecters, n=337), dual users (n=248), ex-smokers who vaped (switchers, n=43) and those who had quit all products (n=101).

- **Key findings**

The safety and efficacy of products was rated as more important by those who had switched than quit all products or rejecters. Switchers also rated acceptability and flavours as significantly more important than those who had stopped using all products. Dual users and switchers said they felt better about using an e-cigarette and that it made them feel relaxed, compared to rejecters and those who had stopped using all products.

E-cigarette rejecters were far less likely to state that they enjoyed using e-cigarettes more than smoking. Results for dual users and those who stopped using all products were similar. Only around 50% of switchers said that e-cigarettes were more enjoyable than smoking, with around a third rating enjoyment about the same.

Dual users and switchers were more likely to use more advanced products rather than basic e-cigarettes.

- **Limitations**

The survey used self-reported and subjective measures and statements were prescriptive rather than free-text responses, so it may be that other factors were important for users. Statements about reasons for using e-cigarettes were rated by participants in terms of importance but agreement with statements was not measured. This may have led to confusion in participants who for example weren't sure whether e-cigarettes were less harmful than cigarettes so didn't rate this as important.

The survey was conducted June – November 2014 so it may be that current products might be rated differently.

Pechacek TF, Nayak P, Gregory KR, Weaver SR, Eriksen MP. The Potential That Electronic Nicotine Delivery Systems Can be a Disruptive Technology: Results From a National Survey. *Nicotine Tob Res.* 2016 May 3. pii: ntw102.

3. [“Skittles & Red Bull is my favourite flavour”: E-cigarettes, smoking, vaping and the changing landscape of nicotine consumption amongst British teenagers – implications for the normalisation debate](#)

- **Study aims**

This mixed-methods study conducted between April and July 2014 in the North West of England used quantitative surveys (total n= over 3,733) and qualitative interviews, focus groups and research events (total n=109) to explore attitudes and behaviours towards e-cigarettes and tobacco, particularly in relation to normalisation. Normalisation was investigated through availability, legality, use, risk perception, knowledge and cultural accommodation.

- **Key findings**

In the surveys, accessing / ever use of e-cigarettes was low among never smokers and when those who had not smoked but had used shisha were removed, this was even lower at 4%. In the older college sample, there was a higher level of ever e-cigarette use (56%) but only 16% identified as current e-cigarette users. There were more male than female e-cigarette users.

Only 28% of users mentioned smoking cessation as a motivation for e-cigarette use. A key reason for interest seemed to be flavours and performing tricks, particularly for boys in their early-mid teens. E-cigarettes were also seen by some as a status symbol.

Ratings of perceived harm of e-cigarettes were quite evenly spaced across the 0-10 scale (mean 5.4) whereas the majority rated cigarettes as very harmful (mean 8.4). Participants discussed risks and benefits and there was awareness of the debate around risk and uncertainties in the evidence. However caution in terms of the lack of evidence didn't seem to be linked with whether a participant had used e-cigarettes. Some participants also spoke about e-cigarettes as a passing fad.

- **Limitations**

This study was conducted in the North West of England where e-cigarette use is reported to be highest in the country so there may be quite specific influences at play here.

It's not clear whether young people were using e-cigarettes with or without nicotine, though the effects of nicotine were not a key motivation for use.

Measham F, O'Brien K, Turnbull G. “Skittles & Red Bull is my favourite flavour”: E-cigarettes, smoking, vaping and the changing landscape of nicotine consumption amongst British teenagers – implications for the normalisation debate. *Drugs: Education, Prevention and Policy.* doi:10.1080/09687637.2016.1178708

4. [E-Cigarette Marketing Exposure Is Associated With E-Cigarette Use Among US Youth.](#)

- **Study aims**

This analysis of the nationally representative middle and high school US National Youth Tobacco Survey 2014 (n=22,007), looked for an association between self-reported exposure

to e-cigarette marketing (through internet, print, retail, and TV/movies) and use of and susceptibility to use of e-cigarettes. E-cigarette use was split into “ever” and “current” (defined as any use in the past 30 days) and “susceptibility” was any response other than “definitely not” to questions about potential use or curiosity. Any form of tobacco use was controlled for, as well as race/ethnicity, gender and school year.

- **Key findings**

19.8% of young people reported ever use of e-cigarettes, 9.3% current use and 32.8% of never users were deemed susceptible to use.

There was an association between self-reported awareness of e-cigarette advertising on each of the channels and ever, current and susceptibility to e-cigarette use (odds ratios between 1.16 and 1.68) and use increased with each additional channel of exposure.

- **Limitations**

The exposure measure was self-reported and relies on the participants noticing these adverts and correctly recalling them. There’s no way to know how accurate a representation this is of actual exposure. The susceptibility measure used here has not been validated as a predictor of e-cigarette use. A more thorough definition of “current use” could have been used as once in the last 30 days could be only be capturing recent experimentation rather than regular use.

The cross-sectional nature of the survey means the directionality of the associations cannot be known. There are also other potential confounders which have not been taken into account e.g. socio-economic status, peer tobacco/e-cigarette use or personality traits

Mantey DS, Cooper MR, Clendennen SL, Pasch KE, Perry CL. E-Cigarette Marketing Exposure Is Associated With E-Cigarette Use Among US Youth. *J Adolesc Health*. 2016 Apr 12. pii: S1054-139X(16)00064-1. doi: 10.1016/j.jadohealth.2016.03.003.

5. [Relationship between e-cigarette point of sale recall and e-cigarette use in secondary school children: a cross-sectional study.](#)

- **Study aims**

This Scottish study examined whether exposure to e-cigarette advertising was associated with use, and intention to use, e-cigarettes in secondary school children. 3,808 children from four diverse schools were surveyed about recall of e-cigarette and cigarette advertising at the point of sale (POS) in supermarkets, small shops, internet advertising and other (billboards, radio etc.), e-cigarette and cigarette use and intention in early 2015. Demographic variables were controlled for.

- **Key findings**

The strongest factor associated with e-cigarette use or intention to use was previous tobacco use, and previous e-cigarette use for future intention (adjusted OR 0.08 (99% CI: 0.05 to 0.12) for e-cigarette use in never smokers). Age was also associated but other demographic variables were not.

In the adjusted analysis, only recall of advertising at POS in small shops and online were significantly associated with ever e-cigarette use (OR 1.93 (99% CI: 1.51 to 2.48) and 1.72 (99% CI: 1.17 to 2.52) respectively), not POS in supermarkets or other e-cigarette advertising. For intention to try e-cigarettes in the next 6 months, recall of POS advertising in

both supermarkets and small shops was significantly associated (OR 1.59 (99% CI: 1.17 to 2.17) and OR 1.87 (99% CI: 1.04 to 3.35)) but other advertising was not. The magnitude of these associations was similar to those for tobacco POS advertising.

- **Limitations**

These results are cross-sectional so causality cannot be claimed for these associations, however this is one stage of a longitudinal study. This is not a representative sample but demographic variables were controlled for.

E-cigarette use was grouped into ever and never users. Although they were also asked about frequency of use, these data are not reported. The study did not explore the position of the advertising (for example was it near sweets or tobacco), the content or young peoples' perceptions of the advertising which may have differed greatly and caused different outcomes.

Best C, Haseen F, van der Sluijs W, Ozakinci G, Currie D, Eadie D, Stead M, MacKintosh AM, Pearce J, Tisch C, MacGregor A, Amos A, Frank J, Haw S. Relationship between e-cigarette point of sale recall and e-cigarette use in secondary school children: a cross-sectional study. *BMC Public Health*. 2016 Apr 14;16(1):310. doi: 10.1186/s12889-016-2968-2.

Overview

This briefing covers the months of April and May 2016. As the list below illustrates, there have been a significant number of new studies published during this period, and we have selected five that may be of particular interest to UKECRF readers.

Regular readers will recall that there are now a few published systematic reviews of e-cigarettes for smoking cessation. Most notable amongst these is the [Cochrane review](#) of e-cigarettes published in December 2014 which found, using the rigorous methods required by Cochrane, that emerging evidence that e-cigarettes can help smokers stop or reduce their smoking. Subsequently a [further review](#) involving a very wide range of studies using different designs concluded that e-cigarettes were not effective for cessation. The first paper we summarise this month is the most up to date systematic review of e-cigarettes for smoking cessation and clearly illustrates why drawing firm conclusions in this area is so challenging. The Canadian team who conducted the review carefully assessed all the available evidence up to February 2016 and 62 papers met their inclusion criteria. What they found was that the vast majority of studies had many limitations and were assessed as low to very low quality, with a few notable exceptions including some studies from the UK. Their overall summary 'that there is too much uncontrolled variation to allow for a general conclusion to be made' is instructive. In particular, they highlight the need for good quality randomised controlled trials and longitudinal studies that use consistent measures of reduction and cessation. They underscore the need for standard measures in this field both for trials and studies using other designs. These two topics - RCTs of e-cigarettes for cessation, and standard survey questions - are issues that UKECRF members are actively working on, and we look forward to further publications that can help address important questions around e-cigarettes for smoking cessation.

The second study summarised here outlines results from a national survey in the USA that included 729 ever users of e-cigarettes and examined differences between those who continued to smoke and had stopped using e-cigarettes, dual users, ex-smokers who used e-cigarettes and people who had stopped both smoking and using e-cigarettes. This is a novel study, as despite being a cross-sectional survey and relying on retrospective recall, it does shed some light on reasons for starting, stopping or continuing e-cigarette use amongst smokers and ex-smokers. The biggest group in the survey (n=337) were current smokers who had tried e-cigarettes but stopped using them, largely

because they found them less satisfying or not as enjoyable to use as tobacco cigarettes. This may well reflect the variety of products on the market and the fact that some are not effective nicotine delivery devices, making cessation less likely. People who had stopped smoking were more likely to report that the device they used was a satisfying alternative to smoking, although almost one in six still thought e-cigarettes were less enjoyable than smoking. The authors concluded that e-cigarettes may not be a viable alternative to cigarettes for most smokers unless the devices improve - or, it could be argued, unless smokers are directed to more effective products in terms of nicotine delivery or product characteristics that suit them. This perhaps tallies with current discussions in the UK about experienced vapers helping smokers to switch or stop smoking services learning how best to integrate discussions about e-cigarettes alongside more established approaches to smoking cessation.

The third study is from the UK and provides a useful snapshot of the views of further education students and school pupils in the North West of England drawing on qualitative work and a trading standards survey. This sociological study deserves closer reading as it provides a useful overview of relevant literature in the background section including current debates around young people and vaping. Findings were mixed, but current use was low (16%) and, as previous studies have found, was concentrated in current tobacco smokers. One in four mentioned e-cigarettes for smoking cessation, but the primary pattern was experimentation involving interest in flavours and with some seeing experimentation as simply a 'fad'. Harm perceptions were high, again as previous UK studies have found with the majority seeing e-cigarettes as harmful. As the sample in both parts of the study was quite diverse, the findings point to both gender and age differences that merit further exploration in future studies.

The fourth and fifth studies included here examine e-cigarette marketing and use amongst young people in the USA and Scotland. An issue that covers both studies is that e-cigarette use was simply divided into a binary category - in the first survey, 'ever' or 'current' use (as in the past 30 days) and in the second study 'ever' or 'never' use. Given the diversity of patterns of e-cigarette use in young people (as illustrated in study three in our bulletin described above) this type of simple breakdown isn't particularly instructive and makes drawing conclusions about the relationship between use and different exposures (to marketing, for example) very difficult to assess.

Despite this limitation, the fourth study adds to the literature on e-cigarette marketing and young people and shows some relationship between awareness of e-cigarette advertising (on the internet, in print media, at the point of sale and in TV or film) and both ever and past 30 day use. The more marketing young people had seen through different media, the stronger the association. The fifth study found a similar pattern but in this case between ever use and seeing e-cigarettes at the point of sale in Scotland. CRUK has recently commissioned a study that will involve an update of previous systematic reviews of the literature on e-cigarette marketing (to both adults and youth) and this review should allow both these studies to be assessed in the context of the wider e-cigarette marketing literature. In addition, the introduction of the Tobacco Products Directive (which bans all e-cigarette marketing in print and broadcast media and promotional ads online) and additional regulations in Scotland (which will also prohibit billboards, direct mail and leafleting) provides a clear opportunity for research on the impact of these changes and also comparative research with countries such as the USA where most forms of e-cigarette marketing will continue to be permitted.

Other studies from the two last months that you may find of interest:

- [Knowledge and beliefs about electronic cigarettes among quitline cessation staff.](#)

- [Persisting long term benefits of smoking abstinence and reduction in asthmatic smokers who have switched to electronic cigarettes.](#)
- [Cigarette smoke but not electronic cigarette aerosol activates a stress response in human coronary artery endothelial cells in culture.](#)
- [Electronic Cigarettes Use and Intention to Cigarette Smoking among Never-Smoking Adolescents and Young Adults: A Meta-Analysis.](#)
- [Real-Time Measurement of Electronic Cigarette Aerosol Size Distribution and Metals Content Analysis.](#)
- [Electronic cigarettes: a systematic review of available studies on health risk assessment.](#)
- [Modeling the Effects of E-Cigarettes on Smoking Behavior: Implications for Future Adult Smoking Prevalence.](#)
- [E-cigarette advertising exposure and implicit attitudes among young adult non-smokers.](#)
- [Acute impact of tobacco versus electronic cigarette smoking on oxidative stress and vascular function.](#)
- [Adolescents' Perceptions of Health Risks, Social Risks, and Benefits Differ Across Tobacco Products.](#)
- [E-cigarette use and subsequent cigarette and marijuana use among Hispanic young adults.](#)
- [Determination of Chemical Compounds Generated from Second-generation E-cigarettes Using a Sorbent Cartridge Followed by a Two-step Elution Method.](#)
- [Is the E-Liquid Industry Regulating Itself? A Look at E-Liquid Internet Vendors in the United States.](#)
- [Passive exposure to nicotine from e-cigarettes.](#)
- [The influence of electronic cigarette age purchasing restrictions on adolescent tobacco and marijuana use.](#)
- [E-cigarettes, hookah pens and vapes: Adolescent and young adult perceptions of Electronic Nicotine Delivery Systems.](#)
- [Transcriptome sequencing reveals e-cigarette vapor and mainstream-smoke from tobacco cigarettes activate different gene expression profiles in human bronchial epithelial cells](#)
- [Tobacco Use Among Middle and High School Students - United States, 2011-2015.](#)
- [Second-hand smoke exposure generated by new electronic devices \(IQOS® and e-cigs\) and traditional cigarettes: submicron particle behaviour in human respiratory system.](#)

Search strategy

The Pubmed database is searched in the middle of each month, for the previous month using the following search terms: e-cigarette*[title/abstract] OR electronic cigarette*[title/abstract] OR e-cig[title/abstract] OR (nicotine AND (vaporizer OR vapourizer OR vaporiser OR vapouriser))

Based on the titles and abstracts new studies on e-cigarettes that may be relevant to health, the UK and the UKECRF key questions are identified. Only peer-reviewed primary studies and systematic reviews are included – commentaries will not be included. Please note studies funded by the tobacco industry will be excluded.

This briefing is produced by Nicola Smith from Cancer Research UK with assistance from Professor Linda Bauld and Kathryn Angus at the University of Stirling and the UK Centre for Tobacco and

Alcohol Studies, primarily for the benefit of members of the CRUK & PHE UK E-Cigarette Research Forum. If you wish to circulate to external parties, do not make any alterations to the contents and provide a full acknowledgement. Kindly note Cancer Research UK cannot be responsible for the contents once externally circulated.