

THE UK ELECTRONIC CIGARETTE RESEARCH FORUM

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Electronic Cigarette Research Briefing – March 2017

This research briefing is part of a series of monthly updates aiming to provide an overview of new studies on electronic cigarettes. The 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 text below provides a critical overview of each of the selected studies then puts the study findings in the context of the wider literature and research gaps.

The studies selected and further reading list do not cover every e-cigarette-related study published each month. Instead they include high profile studies most relevant to key themes identified by the UK Electronic Cigarette Research Forum; including efficacy and safety, smoking cessation, population level impact and marketing. For an explanation of the search strategy used, please see the end of this briefing.

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

1. Does the regulatory environment for e-cigarettes influence the effectiveness of e-cigarettes for smoking cessation?: Longitudinal findings from the ITC Four Country Survey

- **Study aims**

This international study is the first to explore how different regulatory environments between countries may influence the real-world effectiveness of e-cigarettes for smoking cessation. Data from the International Tobacco Control Four Country surveys, from the US, Canada, UK and Australia were collected between 2010 and 2014. For analyses, the countries were divided into those with more restrictive policy environments (Canada & Australia), and those with less restrictive policy environments (US & UK).

The study included smokers at baseline who reported having made a quit attempt at follow-up. The primary outcome was self-reported abstinence for at least 30 days, regardless of smoking status at follow-up.

- **Key findings**

Compared to unassisted quitting (with no medications or e-cigarettes), smokers who used e-cigarettes to quit from countries with less restrictive policy environments were more likely to report at least 30 day abstinence (OR = 1.95, 95% CI = 1.19-3.20).

Smokers from countries with more restrictive e-cigarette policies were less likely to report at least 30 day abstinence (OR = 0.36, 95% CI = 0.18-0.72) compared to quitting unassisted.

2014 data from the UK and Australia on e-cigarette usage showed that 70.2% of UK smokers who made a quit attempt using e-cigarettes reported using their device on a daily basis (compared to 58.9% in Australia). In the UK, 45.5% reported using a tank system (compared to 35.9%), and 75.3% reported using ones that contain nicotine (compared to 41%).

Use of prescription medication appeared to be more effective compared to unassisted quitting in both environments (less restrictive OR = 2.07, 95% CI = 1.14-3.77, more restrictive OR = 1.69, 95% CI = 1.17-2.46).

Use of NRT only did not show significance in either environment compared to quitting unassisted.

Compared to using e-cigarettes only, in the more restrictive countries, 30 day abstinence was more likely to be achieved through NRT only, prescription medication only, or combination help. In the less restrictive countries, these quit methods achieved broadly similar results to using e-cigarettes.

- **Limitations**

The self-reported abstinence outcome does not assess long-term cessation and includes those that may have returned to smoking. There may also be an element of recall bias in the reporting of quit attempts.

The use of e-cigarettes was not specifically asked about until 2014, and in the UK and Australia only. Earlier survey waves relied on two open-ended questions to report e-cigarette use, which may lead to underestimations of the prevalence of e-cigarette use.

There were small sample sizes for certain analyses e.g. nicotine vs. non-nicotine e-cigarettes and tank systems vs. disposables/replaceable cartridges.

There was a different number of survey waves available from each country, making it harder to make consistent comparisons. The four countries also have different regulations, media coverage, public health systems etc., but were separated into two broad environments.

The study did not look into subgroups of people from each environment, but did adjust for demographic characteristics. There were differences between the samples, with more people from the more restrictive environments having lower income and being less interested in quitting at baseline.

Any of the quit methods (except quitting unassisted), may have had additional behavioural support. In particular, the study is not able to control for the success of prescription medication alone without the effects of additional behavioural support. The questions on NRT use did not differentiate between NRT obtained on prescription or bought over the counter.

Yong H, PhD, Hitchman SC, PhD, Cummings KM, PhD, Borland R, PhD, Gravely SML, PhD, McNeill A, PhD, Fong GT, PhD; Does the regulatory environment for e-cigarettes influence the effectiveness of e-cigarettes for smoking cessation?: Longitudinal findings from the ITC Four Country Survey. Nicotine Tob Res 2017 nt056. doi: 10.1093/ntr/ntx056

2. Restrictions on the use of e-cigarettes in public and private places-current practice and support among adults in Great Britain.

- **Study aims**

This study in Great Britain, looked to assess the current practices for e-cigarette use in homes and the workplace, the characteristics associated with allowing e-cigarette use in the home, and public support for extending smoke-free legislation to include e-cigarettes.

The analysis used the results from a survey completed by adults (n = 11,389) carried out in March 2016.

- **Key findings**

Of those who answered questions on workplace policies (n = 6,798), almost half (47.3%) reported e-cigarette use was not allowed anywhere. 4.1% reported no restrictions, 4.3% reported use was allowed indoors with restrictions, 27.6% reported use was allowed outdoors, and 16.8% did not know their workplace policy. Comparisons showed that respondents of higher socio-economic status were more likely to report restrictions.

More than half (57.5%) of people would not allow e-cigarette use in their home. Allowing use in the home was less likely among: those with less experience/knowledge of e-cigarette/cigarette use; those who perceived nicotine to be causing more than a little of the health harms of smoking; men; those of higher socioeconomic status; Conservative and other party voters; those who would not vote/don't know; and those who live with children.

Just over half (52.2%) of respondents supported an extension of smoke-free laws to include e-cigarettes and a fifth (20.7%) were opposed. Support for this extension was more likely among: those with less experience/knowledge of e-cigarette/cigarette use; those who perceived at least some of the health harms of smoking to come from nicotine; men; younger adults; those of higher socioeconomic status; and those living with children. UKIP voters and those who would not vote/don't know were less likely to support this extension.

- **Limitations**

The initial panel members that were invited to undertake the survey met representation quotas. But the 12,157 respondents were not an entirely representative group (older, higher social grades and lower smoking prevalence). Over-represented groups were less likely to allow e-cigarette use in the home, and more likely to support an extension of smoke-free laws.

The study does not provide any reasons as to why people may allow or disallow e-cigarette use in the home, or support or oppose the extension to smoke-free legislation.

Many respondents did not know the regulations regarding the use of e-cigarettes in their workplace, and some may have over reported the restrictions in their workplace.

The wording of the question to assess policy support was complex and had a low reading ease. And the questions on perceived harm did not differentiate between harms to users/bystanders, or between e-cigarettes containing nicotine or not.

Brose LS, McNeill A, Arnott D, Cheeseman H; Restrictions on the use of e-cigarettes in public and private places—current practice and support among adults in Great Britain. *Eur J Public Health* 2017 ckw268. doi: 10.1093/eurpub/ckw268

3. What factors are associated with current smokers using or stopping e-cigarette use?

- **Study aims**

This UK study was a secondary analysis of existing data on 1,489 adult smokers, 18 and above, from a population-based online survey undertaken in March 2016. The study assessed associations of different e-cigarette use statuses (never e-cigarette users, past triers, past users, and current dual users) with motivation to stop smoking. It also looked at the reasons for e-cigarette use or discontinuation and the characteristics associated with usage among those that had at least tried e-cigarettes (n = 953).

- **Key findings**

Multivariable logistic regression analysis showed that current dual users had the highest intention to stop smoking in the next 3 months compared to past users (AOR = 1.95, 95% CI = 1.10-3.46). Never users and those that had tried e-cigarettes in the past had similar intentions to stop as past users.

The most common reasons for using e-cigarettes were to give it a try, and to help stop, reduce or prevent relapse of smoking.

Current dual users were more likely to use e-cigarettes “to help deal with smoking restrictions” (AOR = 2.03, 95% CI = 1.22-3.38) and “to help reduce smoking” (AOR = 2.40, 95% CI = 1.59-3.64) than past users. They were also less likely to be highly dependent on cigarettes (AOR = 0.54, 95% CI = 0.35-0.86).

Smokers who stopped using e-cigarettes, mostly did so because it “didn’t feel like smoking a cigarette”, “didn’t help with cravings for smoking” and they had only “tried them to see what they were like.”

- **Limitations**

The study only looked at current smokers, so cannot tell us about other e-cigarette users who do not smoke.

The cross-sectional nature of the study means that no causal statements can be made about the observed associations. Data were self-reported, and so could be subject to recall bias.

Survey results are taken at one time-point, so it’s not possible to observe temporal changes in motivations.

Reasons for e-cigarette use and discontinuation were selected from a prescribed list, and “other” was selected as the fourth most popular reason for stopping use.

The study did not find out the nicotine contents of e-cigarettes in any of the users. The reasons for stopping using e-cigarettes were not split by device type or nicotine content used.

Smoking dependence was measured using the Heaviness of Smoking index, which might be lower among dual users, who typically use less cigarettes than exclusive smokers.

Simonavicius, E., McNeill, A., Arnott, D., & Brose, L. S. (2017). What factors are associated with current smokers using or stopping e-cigarette use?. *Drug and Alcohol Dependence*, 173, 139-143. doi: 10.1016/j.drugalcdep.2017.01.002

4. Patterns of electronic cigarette use and level of psychological distress.

- **Study aims**

This US study of 2014 data used a nationally representative survey of 36,697 non-institutionalised adults to assess the association between psychological distress and e-cigarette use. They also looked at associations between socio-demographic characteristics (such as gender and race/ethnicity) and e-cigarette use.

Participants were split into five subgroups: those who ever used e-cigarettes but never smoked (n = 628), former cigarette users who ever used e-cigarettes (n = 898), current dual users (n = 935), those who currently use cigarettes exclusively (n = 3,446) and non-users of either product (n = 21,196).

- **Key findings**

For all categories of those who used or ever used cigarettes or e-cigarettes, likelihood of use increased with increasing levels of psychological distress.

At the highest category of psychological distress compared to the lowest category, the adjusted odds ratios for use were: exclusive e-cigarette ever-use (3.7, 95% CI = 1.6-8.6), ever e-cigarette use and former use (3.2, 95% CI = 2.2-4.8), current dual use (4.6, 95% CI = 3.1-6.7) and exclusive current cigarette use (2.1, 95% CI = 1.7-2.6). These odds ratios appeared to rise in an approximately linear manner with psychological distress.

Females were less likely to use e-cigarettes than males (1.5% vs. 2.5% for exclusive e-cigarette ever use). Younger adults (18-24 years) were more likely to use e-cigarettes than older adults (7.5% vs. ≤3.6% for all other age groups). When looking at race/ethnicity, non-Hispanic blacks had the lowest exclusive e-cigarette ever use (1.2%), which was significantly less than non-Hispanic whites under the multivariate logistic regression model.

- **Limitations**

The response rate for the survey was only 58.9%, so results may be affected by a non-response bias.

The small sample size meant analyses could not be carried out for current exclusive e-cigarette users. It's worth noting that ever e-cigarette use includes those who tried them only once, and therefore does not equate to regular use.

Psychological distress was assessed using a self-reported measure, and does not define the nature of the distress or whether it was transient or longstanding. E-cigarette use was also self-reported, and used a method that has not been validated.

The study can't conclude the direction of the relationship between e-cigarette use and psychological distress, or whether e-cigarettes act as a gateway into smoking for people under psychological distress.

The study does not explore whether people had used nicotine-containing or nicotine-free e-cigarettes.

Park SH, Lee L, Shearston JA, Weitzman M (2017) Patterns of electronic cigarette use and level of psychological distress. PLOS ONE 12(3): e0173625. doi: 10.1371/journal.pone.0173625

5. [Why do people use electronic nicotine delivery systems \(electronic cigarettes\)? A content analysis of Twitter, 2012-2015.](#)

- **Study aims**

This US study aimed to identify the reasons for e-cigarette use by using a content analysis of public Twitter posts from 2012-2015, and demonstrate the feasibility of this method. From a dataset of 3.3 million tweets, after exclusions (such as those with URLs, spam and retweets) and refinement of tweets to select those that indicated e-cigarette use by the tweeter or another person, a sample of 2,900 tweets for each year was selected for analysis. Tweets were then split into 7 broad categories of reasons for e-cigarette use.

- **Key findings**

During 2012, the most common reason cited for using e-cigarettes was to quit using combustibles (43%, 95% CI = 39-48). This was more than double any other reason.

The other reasons cited in 2012 were: social image (21%, 95% CI = 18-25), use indoors (17%, 95% CI = 14-20), flavour choices (14%, 95% CI = 11-17), safety relative to combustibles (9%, 95% CI = 7-11), favourable odour (3%, 95% CI = 2-5) and low cost (2%, 95% CI = 2-5).

By 2015, the most common reason cited was social image (37%, 95% CI = 32-43). Quitting combustibles fell to second (29%, 95% CI = 24-33). Use indoors fell from third to fourth (12%, 95% CI = 9-16). While favourable odour rose to 5% (95% CI = 2-5). Flavour choices, low cost and safety all remained stable from 2012 to 2015.

- **Limitations**

The data doesn't represent the number of people that are using e-cigarettes for the aforementioned reasons in the real-world, and social media posts may not represent actual motivations. Neither can the study differentiate between the tweets of never smokers and current or ex-smokers. It only displays the proportion of a random sample of published tweets mentioning reasons for e-cigarette use.

Changes in proportions over time may not reflect an actual increase/decrease in that reason as motivation for using e-cigarettes, as these numbers will be affected by increases/decreases in other reasons. This study is only able to compare differences between reasons.

The study does not represent all reasons for using e-cigarettes, and excludes ones that fall outside the broad categories selected e.g. reasons focused on personal emotions.

Twitter users are not representative of the population, and the tweets used weren't selected for representation. The study also only included English language tweets, further limiting the sample.

The study isn't able to assess any usage habits, such as regularity or types of products used.

Ayers JW, Leas EC, Allem J-P, et al. Why do people use electronic nicotine delivery systems (electronic cigarettes)? A content analysis of Twitter, 2012-2015. Olson DR, ed. PLoS ONE. 2017;12(3):e0170702. doi:10.1371/journal.pone.0170702.

Overview

This month we have included five papers, the first three from the UK, authored by UKECRF participants, and a further two from the USA. It's also worth noting the very large number of other papers we identified since the last bulletin, which are listed as usual at the end of this commentary.

Countries around the world have adopted different regulatory frameworks for e-cigarettes, and examining how these might affect the use of these products is the focus of the first paper. This draws on data from the well-established International Tobacco Control survey, now active in more than 20 countries. Here the focus is to compare two countries with restrictive policies at the time (2010-2014) with two others with less restrictive policies. Thus Canada and Australia, which ban the sale of nicotine containing e-cigarettes, are compared with the UK and the USA that permit sale. It is worth stating at the outset, as the authors do, that this is not a straightforward all or nothing comparison, as Canada's restrictions have not been well enforced and Australian vapers can still obtain devices and e-liquids online. Likewise even in 2014 the UK had some regulation in place, such as limits on advertising, and many US states had banned indoor use, for example. Since 2014 further restrictions have been added in the UK and USA, while in contrast Canada is now moving to less restrictive policies in a bill currently passing through the Canadian senate.

Overall, the article finds that smokers were far more likely to self-report having successfully stopped smoking in the short term (for at least 30 days) with e-cigarettes in the USA and the UK than in either Canada or Australia. Participants who used an e-cigarette for smoking cessation in the UK or USA were more likely to quit than those who used willpower alone. In Canada and Australia, two countries with more restrictive regulations, those who used e-cigarettes in their last quit attempt were significantly less likely to be successful compared to willpower alone, and prescribed medication in particular offered better chances of success. The authors provide a useful discussion on possible explanations for these different results between countries. Different aspects of availability are likely to be part of the explanation (not just opportunity to purchase but also the opportunity to try different products to find the right one, and ability to access ongoing supplies) but other issues may be relevant like social stigma around e-cigarette use in more restrictive policy environments.

Other factors already known to influence success in smoking cessation when using these devices (daily use, nicotine-containing e-liquids, and use of later generation e-cigarettes) were also noted.

The findings of this study are relevant for policy makers considering current or future regulations. The overall message is that restrictive policies may hinder smoking cessation in those using e-cigarettes when trying to quit. The study didn't look at overall smoking cessation trends, so isn't able

to clarify the net impact on smoking prevalence or number of quit attempts. Future waves of the ITC should provide very valuable comparative evidence on this issue as policies change in different countries.

The second study from some members of the same team, with colleagues at ASH, is a fairly straightforward analysis of the 2016 ASH/You Gov survey of adults in Great Britain. Questions were added to the survey on public opinion and current practice surrounding the use of e-cigarettes in public and private spaces. In the UK, e-cigarettes are not included in national smokefree legislation but many companies and workplaces have restricted their use. Indeed, the survey found that almost 8 in 10 participants who were able to report on workplace policies stated that some restrictions were in place around e-cigarette use, with just under half stating that no use was permitted anywhere on workplace premises. Just over half of respondents (58%) did not allow e-cigarette use in their home and a similar proportion (52%) were supportive of extending smokefree laws to include e-cigarettes.

The findings on workplace policies are caveated by the fact that just under one in five participants who were eligible to answer the workplace questions (i.e those who were employed and not working from home, for example) didn't know whether there was a workplace policy and some reporting total bans may have been unclear on policies in outdoor workplaces. In terms of use at home, people who had never smoked or used e-cigarettes were far less likely to allow vaping, as were ex-smokers, older people, men and people from more affluent groups. Those who had inaccurate perceptions around nicotine (who said it was causing more than a little of the health harms of smoking) were also less likely to allow e-cigarette use in their homes. Interestingly, however, almost one in five people living in a residence with someone who smokes most days still did not permit e-cigarette use. These findings on vaping in the home probably reflect public concerns about vaping in general and confusion regarding any health risks from 'second hand' vapour as well as social norms which have undoubtedly shifted since smokefree environments became the norm in the UK.

The findings on considerable support to include vaping as part of smokefree laws were also influenced by respondent characteristics in similar ways to rules around vaping in the home. For example, three out of four people who believed vaping was just as or more harmful than smoking were in support of laws banning vaping in public places compared to just over four in ten who perceived vaping as less harmful.

Overall, this article suggests that both current practice and public views on vaping in workplaces and the home are more restrictive than current policies in the UK. This highlights ongoing challenges for researchers, practitioners and policy-makers around both communication on e-cigarettes and promoting policies that aim to strike the right balance between risks and benefits.

The same survey provided the basis for this month's third article on factors associated with current smokers using or stopping e-cigarette use. In contrast to the article above, here the focus of the analysis was smokers. All current smokers who responded to the survey (n=1,489) were asked about motivation to stop smoking and e-cigarette use, and all smokers who had tried e-cigarettes at any time (n=953) were asked about reasons and characteristics for use or discontinuation of use. In this latter group, respondents were divided into 'past users' who had tried any kind of e-cigarette only once or twice, or used them less than twice a month, and 'past users' who had used any kind of e-cigarette at least once a week.

The authors then used responses from other questions in the survey to examine associations between motivation for use and reasons and characteristics related to use. Motivation differed by a range of respondent characteristics but dual users of tobacco and e-cigarettes were more motivated to stop smoking (assessed by using a standard measure) than either past users or smokers who had never tried e-cigarettes. Dual users were far more likely to report using e-cigarettes to cut down or avoid smoking restrictions than past users or those that had just tried them.

When asked about reasons for stopping use, most reported that e-cigarettes did not help with cravings or feel like smoking. The authors point out that these findings are similar to some previous survey results in the US and UK. Arguably, they lend weight to possible policy and practice recommendations. These are that having a goal related to e-cigarette use (i.e to stop smoking) is relevant for continued use and assessing this may help identify (for example, amongst e-cigarette users accessing stop smoking services or seeking advice from a health professional) those most likely to eventually move away from tobacco entirely. In addition, more dependent users may simply find that the devices they access do not serve as a sufficient replacement for smoking and they may need more support or information (advice on switching to a better device, use of licensed stop smoking medication alongside vaping) to stop smoking in the longer term.

The fourth article this month assessed psychological distress (using a standard measure based on feelings of depression, nervousness or similar feelings in the last 30 days) amongst adults aged 18+ who took part in the 2014 National Health Interview Survey in the USA. Just under 37,000 respondents were included in the analysis who fell into one of the following five categories: people who had tried an e-cigarette at least once but smoked fewer than 100 cigarettes in their lifetime (n=628); people who had smoked in the past or tried e-cigarettes at least once in the past but no longer used either (n=898); current dual users (n=935); current smokers who had never tried e-cigarettes (n=3,446); and non smokers/never e-cigarette users (n=21,196).

Scoring higher on the measure of psychological distress was associated with any current or past use of both e-cigarettes and tobacco. Previous studies have found this relationship for tobacco use only, and this study suggests that people at risk of mental health problems may be attracted to at least try e-cigarettes in a similar way to smoking. In fact the clearest relationship between psychological distress and e-cigarette or tobacco use was observed in current dual users of both products.

The discussion section in the article seems to be written with the view that people at risk of mental health problems should use neither e-cigarettes nor tobacco. The small group who had only tried e-cigarettes but either never smoked or only experimented with smoking is particularly interesting. This group tended to be younger than the other groups, on average, and it is plausible that e-cigarettes may provide an alternative to tobacco in this group although the article appears not to encourage this, stating arguments about routes into nicotine addiction and possible future smoking (although no questions were asked or reported about device characteristics such as whether the e-cigarette they tried contained nicotine). Overall, however, the study provides useful data on how e-cigarettes might relate to smoking status amongst those at risk of mental health problems and underlines the importance of research to examine if these devices may have a role in smoking cessation amongst a group who are at high risk of tobacco use.

Finally we include an article from the USA that used social media to assess possible reasons why people use e-cigarettes. As we've outlined previously in this bulletin, social media analysis (in this case examining data from Twitter) is becoming an increasingly common route for examining public perceptions of e-cigarettes. There are obviously strengths and also considerable weaknesses to

drawing conclusions from these types of data and some (but not all) of these limitations are highlighted by the authors of this particular article.

Almost 6,000 English language tweets were selected from a dataset of 3.3 million tweets referencing e-cigarettes from 2012 and 2015. These were examined with the aim of testing the feasibility of looking at tweets to examine rationales for vaping. The article hinges on differences the authors identified between the two years. The authors grouped the nature of tweets into a taxonomy with seven top reasons: low cost, flavour choice, safe to use, can vape indoors, favourable odour, quitting combustibles, and social image (with an example tweet in this last category being 'Ecigs are so freaking cool and now I have one!'). In 2012 smoking cessation was found to be by far the most important reason cited for using e-cigarettes, cited in 43% of tweets followed by social image (21%) and to use indoors (14%). By 2015 this had shifted to social image being the most commonly cited reason (37%) followed by smoking cessation (29%) and use indoors (12%).

The authors speculate on the reasons for this possible shift and point to plausible and perhaps not so plausible factors, some of which will be highly country-specific in terms of the regulatory context so the caveats around their conclusions are substantial. They rightly point out that since 2012 in the USA vaping indoors has been banned in many places so it is not surprising that use to circumvent smokefree laws has become a less common reason for use. They also point out that advertising of e-cigarettes may be one reason why social image has become a more prominent type of tweet. This is perhaps more difficult to interpret as while few restrictions on advertising have been put in place in the USA, they have been in other English speaking countries where Twitter account holders may reside. Also even in those jurisdictions, permitted advertising has not been allowed to include information on smoking cessation as devices are not medicinally licensed, so ads have focused on appeal or other factors. If advertising is a driver of social media discourse on e-cigarettes, it is perhaps hardly surprising that smoking cessation is not such a prominent element of Tweets relating to these devices. However, the article does highlight how social media could be one tool to explore public perception, and that this type of analysis may allow for the inclusion of a 'snapshot' of views from a larger number of participants than surveys or qualitative research, and at lower cost.

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

- [Impact of Different e-Cigarette Generation and Models on Cognitive Performances, Craving and Gesture: A Randomized Cross-Over Trial \(CogEcig\).](#)
- [The Importance of Conditioned Stimuli in Cigarette and E-Cigarette Craving Reduction by E-Cigarettes.](#)
- [Measuring PM2.5, Ultrafine Particles, Air Nicotine and Wipe Samples Following the Use of Electronic Cigarettes.](#)
- [The Relationships of Expectancies With E-cigarette Use Among Hospitalized Smokers: A Prospective Longitudinal Study.](#)
- [Depressive Symptoms Predict Current E-Cigarette Use Among College Students in Texas.](#)
- [Electronic nicotine delivery systems and/or electronic non-nicotine delivery systems for tobacco smoking cessation or reduction: a systematic review and meta-analysis.](#)
- [Prevalence and correlates of current daily use of electronic cigarettes in the European Union: analysis of the 2014 Eurobarometer survey.](#)

- [Trends in awareness, use of, and beliefs about electronic cigarette and snus among a longitudinal cohort of US Midwest young adults.](#)
- [E-smoking among students of medicine - frequency, pattern and motivations.](#)
- [Solvent Chemistry in the Electronic Cigarette Reaction Vessel.](#)
- [Lung cancer specialist physicians' attitudes towards e-cigarettes: A nationwide survey.](#)
- [Electronic Cigarette Use and Smoking Abstinence in Japan: A Cross-Sectional Study of Quitting Methods.](#)
- [Smoking behaviors and intentions among current e-cigarette users, cigarette smokers, and dual users: A national survey of U.S. high school seniors.](#)
- [High dilution surface-enhanced Raman spectroscopy for rapid determination of nicotine in e-liquids for electronic cigarettes.](#)
- [Myofibroblast differentiation and its functional properties are inhibited by nicotine and e-cigarette via mitochondrial OXPHOS complex III.](#)
- [Electronic Cigarettes Are as Toxic to Skin Flap Survival as Tobacco Cigarettes.](#)
- [Perceived risk and benefits of e-cigarette use among college students.](#)
- [Universal electronic-cigarette test: physiochemical characterization of reference e-liquid.](#)
- [Monitoring nicotine intake from e-cigarettes: measurement of parent drug and metabolites in oral fluid and plasma.](#)
- [User Identified Positive Outcome Expectancies of Electronic Cigarette Use: A Concept Mapping Study.](#)
- [Distinctive role of opinion leaders in the social networks of school adolescents: an investigation of e-cigarette use.](#)
- [Benzene formation in electronic cigarettes.](#)
- [Exposure to 1,2-Propanediol Impacts Early Development of Zebrafish \(Danio rerio\) and Induces Hyperactivity.](#)
- [Skin contamination as pathway for nicotine intoxication in vapers.](#)
- [Beliefs About the Direct Comparison of E-Cigarettes and Cigarettes.](#)
- [Daily users compared to less frequent users find vape as or more satisfying and less dangerous than cigarettes, and are likelier to use non-cig-alike vaping products.](#)
- [Associations of attitudes towards electronic cigarettes with advertisement exposure and social determinants: a cross sectional study.](#)
- [National and State Trends in Sales of Cigarettes and E-Cigarettes, U.S., 2011-2015.](#)
- [Nicotine sales to minors: Store-level comparison of e-cigarette vs. cigarette violation rates.](#)
- [A Descriptive Report of Electronic Cigarette Use After Participation in a Community-Based Tobacco Cessation Trial.](#)
- [Modifications in Human Oral Fibroblast Ultrastructure, Collagen Production and Lysosomal Compartment in Response to E-Cigarette Fluids.](#)
- [Inflammatory Response and Barrier Dysfunction by Different e-Cigarette Flavoring Chemicals Identified by Gas Chromatography-Mass Spectrometry in e-Liquids and e-Vapors on Human Lung Epithelial Cells and Fibroblasts.](#)
- [A Comparison of Alternative Tobacco Product Usage, Knowledge and Beliefs Between the New York City Lesbian, Gay, Bisexual, and Transgendered Community and Heterosexuals.](#)
- [The Relation between Frequency of E-Cigarette Use and Frequency and Intensity of Cigarette Smoking among South Korean Adolescents.](#)

- [Ethanol Concentration in 56 Refillable Electronic Cigarettes Liquid Formulations Determined by Headspace Gas Chromatography with Flame Ionization Detector \(HS-GC-FID\).](#)
- [Predictors of Adult E-Cigarette Users Vaporizing Cannabis Using E-Cigarettes and Vape-Pens.](#)
- [Sales of Nicotine-Containing Electronic Cigarette Products: United States, 2015.](#)

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 Carl Alexander and Nikki 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.