
# Electronic Cigarette Research Briefing – March 2016

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 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 an analysis which estimates the number of additional long-term quitters generated by e-cigarettes in England in 2014, available at: Estimating the population impact of e-cigarettes on smoking cessation in England.

1. "Maybe they should regulate them quite strictly until they know the true dangers": A focus group study exploring UK adolescents' views on e-cigarette regulation.

- **Study aims**
  This qualitative study involved focus groups with 83 teenagers (aged 14-17) in Scotland and England to explore perceptions of e-cigarette regulation between November 2013 and February 2015. A diverse sample was recruited including different genders, socio-economic backgrounds and cigarette and e-cigarette experience.

- **Key findings**
  When discussing e-cigarette regulation, one of the main issues participants raised was the lack of long-term evidence for e-cigarette safety. Some participants argued that regulation of e-cigarettes should be modelled on tobacco and that the Government had a duty to

protect citizens (particularly children) against harmful or potentially addictive substances, including nicotine. Some participants argued that e-cigarettes could act as a potential gateway into smoking for some people. Overall a majority supported restrictions on e-cigarettes such as banning sales to minors, restricting advertising and banning use in public places where children and young people are present.

Conversely, participants also recognised the risk that regulation could prevent use of e-cigarettes for smoking cessation. Although the majority of participants supported bans for children, some argued that the cut off should be lower than for tobacco (e.g. 16 or 14) and that e-cigarettes could be available to young people as medicines for smoking cessation. However, there was scepticism that manufacturers promoted e-cigarettes to aid smoking cessation.

- **Limitations**
  This study population was not designed to be representative of Scotland or England. The qualitative analysis and description of findings also means it's unclear what the size of the majority was, how the strength of support varied for the different measures or whether there was influence of strong characters in a group, for example. Promotional advertising materials (posters and stills from TV and online adverts) were used to stimulate discussion and these could have shaped the views of participants.

  Although participants drew parallels in some instances with the regulation of tobacco products, this study didn't directly compare perceptions on regulation with other products which may have uncertainty around long-term impact and potential for harm, or known harms such as alcohol or junk food.

Weishaar H, Trevisan F, Hilton S. "Maybe they should regulate them quite strictly until they know the true dangers": A focus group study exploring UK adolescents' views on e-cigarette regulation. Addiction. 2016 Mar 7. doi: 10.1111/add.13377.

2. Does exposure to cigarette brands increase the likelihood of adolescent e-cigarette use? A cross-sectional study.

- **Study aims**
  This cross-sectional survey in Scotland asked 1,633 school children (aged around 14 and 16) about their awareness of e-cigarettes and specific brands, and tobacco and e-cigarette use in February 2014. Participants were also asked about intention to use an e-cigarette in the next 6 months.

- **Key findings**
  Never smokers were extremely unlikely to have tried an e-cigarette (adjusted OR 0.10 (99% CI 0.07 -0.16)).Having a best friend who smoked was strongly associated with ever e-cigarette use (adjusted OR 3.17 (99% CI 1.42 – 7.09)) and tobacco brand recognition was also associated, although to a lesser extent (adjusted OR 1.20 (99% CI 1.05 – 1.38)).

  Never smokers were also significantly less likely to report an intention to try an e-cigarette in the next 6 months (adjusted OR 0.07 (99% CI 0.02 -0.25) as were those who had a parent who smoked. Intention to try was associated with higher tobacco brand recognition, higher local tobacco outlet density, having a friend who smoked and hanging around the street.

- **Limitations**

This study population was not designed to be representative of Scotland or the UK and as it was cross-sectional, the directionality of the associations cannot be known. It's also not clear how stated intentions would translate into actual behaviour.

E-cigarette use was grouped into ever and never use and they only asked about cig-a-likes ("An e-cigarette is a tube that looks similar to a normal cigarette. An e-cigarette may have a glowing tip and puffs a vapour that looks like smoke but unlike normal cigarettes, they don't burn tobacco.") In addition the study does not report sample sizes for key categories of smoking and e-cigarette use. In particular, there is no n= shown for the number of current or never smokers who had tried an e-cigarette, and although participants were asked about ever vs. regular use of e-cigarettes, number of respondents for these categories are also not reported.

Best C, van der Sluijs W, Haseen F, Eadie D, Stead M, MacKintosh AM, Pearce J, Tisch C, MacGregor A, Amos A, Miller M, Frank J, Haw S. Does exposure to cigarette brands increase the likelihood of adolescent e-cigarette use? A cross-sectional study. BMJ Open. 2016 Feb 23;6(2):e008734. doi: 10.1136/bmjopen-2015-008734.

3. Country-level correlates of e-cigarette use in the European Union.

- **Study aims**
  This Italian study reviewed e-cigarette trial and use in 28 European Union countries in 2014 (from the 2015 Eurobarometer) and their association with country-level tobacco control policies (from the WHO Global Health Observatory Data Repository). Factors such as cigarette smoking prevalence, economic status, educational attainment and health were included in the multi-variate analysis.

- **Key findings**
  The lowest prevalence of current e-cigarette use was seen in Hungary, Lithuania, Malta, Romania, Slovenia and Sweden (less than 1%) and prevalence was highest in the UK (4%). The prevalence of ever e-cigarette use was higher.

  In the multi-variable model, current e-cigarette use was positively associated with best practice for offering smoking cessation support and raising tobacco taxes and negatively associated with having health warnings on tobacco products. Prevalence of cigarette smoking and GDP per person were also associated with prevalence of current e-cigarette use.

- **Limitations**
  Ecological studies are limited by the factors included in the analysis and many possible factors were not included here, such as media and marketing/ advertising of e-cigarettes, availability and healthcare professional attitudes towards these products.

La Torre G, Mipatrini D. Country-level correlates of e-cigarette use in the European Union. Int J Public Health. 2016 Feb 13. doi: 10.1007/s00038-016-0792-1.

4. Electronic cigarette use and indoor air quality in a natural setting.

- **Study aims**

This US study measured particulate matter levels ($PM_{2.5}$) in a hotel, where vaping was permitted, during an e-cigarette event in 2015. Measures were taken before and after the event in different areas of the hotel and averaged for two devices.

- **Key findings**
  During the event, in the main room, mean $PM_{2.5}$ measurements increased from less than 5µg/$m^3$ to 607.12µg/$m^3$. There were 59 – 86 active users observed. 17 hours after the event the measurements were back below 16µg/$m^3$.

- **Limitations**
  The measurements were only conducted in one hotel with a large number of people using e-cigarettes. People who attend an e-cigarette conference are not likely to be representative of all e-cigarette users. It's also not clear whether the room was ventilated at all or if there were any other potential factors that could influence indoor particulate matter.

Soule EK, Maloney SF, Spindle TR, Rudy AK, Hiler MM, Cobb CO. Electronic cigarette use and indoor air quality in a natural setting. Tob Control. 2016 Feb 15. doi: 10.1136/tobaccocontrol-2015-052772.

**Overview**
This month we review four new e-cigarette studies. The first two focus on young people and are from the UK. The third was conducted by an Italian team undertaking secondary analysis of a Europe-wide survey. The fourth study was from the USA and looked at e-cigarette vapour and indoor air quality.

Studies of young people and e-cigarettes are now moving beyond basic cross-sectional surveys of use to examine the correlates of consumption or perceptions of other issues that might influence how young people perceive these devices. With this in mind, the first paper we've included this month provides useful insights into what a sample of young people think about current debates on e-cigarette regulation.

Overall, the 83 teenagers who took part in focus groups in Scotland and England were supportive of e-cigarette regulation. In most cases, they favoured regulation similar to tobacco, including measures that are now in place in the UK, such as age of sale laws. They also favoured regulation that is pending. They supported marketing restrictions, which will be brought in this year via the EU tobacco products directive and additional domestic marketing restrictions in Scotland that have just been voted in by the Scottish Parliament. Support for restrictions on e-cigarette use in public places was also expressed. However, participants also recognised that regulation could have harms - specifically that it could prevent more smokers from using e-cigarettes for smoking cessation. This included young people who were smoking, with some participants recognising that teenagers below the age of 18 who were already smoking might benefit from e-cigarette use. An important caveat to keep in mind when reading this paper is that it almost exclusively reports the views of young people who have very limited experience of e-cigarettes. Only 10 of the 83 participants in the study were current e-cigarette users and all of them were also current smokers. Despite these caveats and others outlined in the paper, this study provides a valuable vehicle for the voices of young people to be heard on topics of current policy interest.

The second paper from the UK focused on the issue that recognising tobacco cigarette brands was significantly associated with ever trying an e-cigarette (or reporting intention to try one) amongst young people in Scotland. Overall, the paper shows that in this sample of 1,404 young people, smoking characteristics (current smoking status, having a best friend who smoked, living in an area

with many shops that sell tobacco) were significant determinants of e-cigarette use. This is consistent with previous research that shows that young smokers are most likely to be using e-cigarettes. Encouragingly never smoking and having a parent who smoked were protective factors for experimentation with e-cigarettes. The findings on tobacco brand recognition are possibly best interpreted as simply another marker of young people who live in families and communities where smoking is still prevalent.

The paper focuses on e-cigarette experimentation (ever use or intention to try) and does not report figures on regular use, despite the survey asking about frequency of use. As we've outlined in previous bulletins, papers need to include clear measures differentiating experimentation and regular use of e-cigarettes particularly between young people who smoke and those who don't. The paper also hypothesises that removal of point of sale tobacco displays in the UK may over time decrease tobacco brand recognition but may leave space for greater recognition of e-cigarette brands which can be displayed at the point of sale. It could be argued that if these displays contribute to e-cigarette uptake in young people who otherwise would have smoked, there would be a public health gain. Alternatively if e-cigarette displays contribute to many never smokers using e-cigarettes regularly (who might otherwise not have smoked), this could be a negative outcome. These are difficult issues to study but certainly merit future research.

Most papers on e-cigarettes focus on particular countries or regions and relatively few surveys look across countries, with some notable exceptions like the International Tobacco Control Survey. The third paper we include this month provides a secondary analysis of the Europe-wide Eurobarometer survey which focuses on a number of issues but included questions on e-cigarettes in 2014. The authors examined data from this survey along with data on policy measures available from the wider Eurostat database and the WHO observatory - specifically offers to help stop smoking (quitlines and cessation services), tobacco taxes and health warnings on tobacco products. Rankings were developed based on the extent to which tobacco control policies were in place in each country (rather than e-cigarette regulation) and compared with current levels of tobacco and e-cigarette use. Overall, countries with stronger tobacco control measures in place had higher levels of e-cigarette use. The authors interpret this in two ways - that higher tobacco taxes favour switching to e-cigarettes (where they are less expensive) and that in countries where quitlines and cessation services are in place, smokers may have better access to advise about cessation and choose less harmful products including e-cigarettes. Interestingly, larger health warnings on tobacco products at the country level were not associated with higher levels of e-cigarette use. This is difficult to interpret, but this preliminary study does point to country-level tobacco control policies having some influence on e-cigarette uptake amongst smokers. Future studies should (as the ITC is already attempting to do) examine not only policies aimed at deterring tobacco use but also e-cigarette regulation in terms of their impact on e-cigarette use and also smoking cessation.

The final study included here focuses on the issue of indoor air quality at a two day e-cigarette event held in a hotel in the USA. Limited details are included on the event itself in the article, but vaping was allowed throughout the hotel. Air quality was assessed primarily in one room, the main meeting venue where 56-86 active vapers were observed at six different time points. Air quality assessment followed standard measures of particulate matter ($PM_{2.5}$) used in previous studies examining, for example, the impact of smokefree legislation. The study found high $PM_{2.5}$ levels in the main meeting room (4,023$m^3$) when 60 or more vapers were present compared with the hotel restaurant (2 vapers observed) and the vacant meeting room the day before and the day after the event. The study team did not conduct any direct comparisons with venues where tobacco smoking is permitted, but refer to previous studies in hookah cafes and bars that permit smoking showing lower $PM_{2.5}$ levels in these venues. The findings of this study differ from another recently conducted in Spain that compared $PM_{2.5}$ levels in homes that allow smoking, no smoking and vaping. However it is perhaps not

surprising that in an indoor venue with many e-cigarette users actively vaping, particulate matter levels were high. Further research is needed to examine $PM_{2.5}$ levels under various situations, the exposure of bystanders to different chemicals in the ambient air following e-cigarette use and any health consequences, in order to inform regulations or guidelines on e-cigarette use indoors.

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

- Comparison of the Performance of Cartomizer Style Electronic Cigarettes from Major Tobacco and Independent Manufacturers.
- A review of the current literature regarding the cardiovascular effects of electronic cigarettes.
- Exploring Attitudes of Children 12-17 Years of Age Toward Electronic Cigarettes.
- Campaigns and counter campaigns: reactions on Twitter to e-cigarette education.

**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.*