

Electronic cigarette research briefing – April 2015

This research briefing is part of a series of monthly updates aiming to provide an overview of new studies on electronic cigarettes (e-cigarettes). The briefings are intended for researchers, policymakers, 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's 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. These include: 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.

1. Associations between e-cigarette access and smoking and drinking behaviours in teenagers

- **Study aims**

This study aimed to explore e-cigarette access by teenagers in the North West of England and how this correlates with demographic and behavioural characteristics. A self-report, cross-sectional survey of over 16,000 14-17 year olds in schools included a single question about trying or purchasing e-cigarettes, as well as exploring drinking and smoking behaviours.

- **Key findings**

19.2% of respondents reported having ever tried or purchased ('accessed') e-cigarettes, 15.8% of whom had never smoked. E-cigarettes access was associated with male gender, having parents/guardians that smoke and respondent's alcohol use but there was no significant association with age or deprivation.

Although the association between binge drinking and e-cigarette access was not significant in regular smokers, it was significant in never smokers. Among drinkers, e-cigarette access was associated with some risky behaviours, such as being violent or in a fight when drunk.

- **Limitations**

This survey asked about whether participants had ever bought or tried electronic cigarettes, not regular use, so a broad range of possible behaviours could be included.

This is not a representative sample so it is not clear how applicable these results are to teenagers in this region as a whole, or across the UK. Also because it is cross-sectional, directionality of these associations cannot be known.

Hughes K, Bellis MA, Hardcastle KA, McHale P, Bennett A, Ireland R, Pike K. Associations between e-cigarette access and smoking and drinking behaviours in teenagers. *BMC Public Health* 2015; 15(244). doi:10.1186/s12889-015-1618-4

2. E-cigarettes versus NRT for smoking reduction or cessation in people with mental illness: secondary analysis of data from the ASCEND trial

- **Study aims**

This post-hoc, secondary analysis examined outcomes for those with mental illness within a previous e-cigarette trial in New Zealand. There were 86 participants from the original trial who were taking medication that could potentially be prescribed for mental illness.

Participants were motivated to quit and either using a daily 21mg nicotine patch or a 16mg or 0mg e-cigarette with low intensity behavioural support for 13 weeks (there was no arm that involved behavioural support alone).

- **Key findings**

At baseline participants with mental illness had higher levels of nicotine dependence but there were no significant differences in outcomes between this group and the other participants, apart from a higher rate of smoking relapse. Similarly to the original trial results, there was no significant difference in quit rates between patches or either strength of e-cigarette.

Adverse events were similar across groups (there was only one study-related adverse event in those with mental illness – a sore throat for one person using the 16mg e-cigarettes) and e-cigarettes were superior to patches for smoking reduction, compliance and acceptability. No significant difference was detected between outcomes for those using nicotine-free e-cigarettes and those with nicotine.

- **Limitations**

There are some limitations arising from the original study, for example the trial was conducted on an early e-cigarette device in 2011-13 in New Zealand, where nicotine e-cigarettes were not permitted to be sold. Statistical power was a problem because smoking abstinence rates were lower than expected so the sample size was too small to detect a significant difference between arms.

This post-hoc secondary analysis had a smaller sample size (between 12 and 39 participants in each arm). These data may not be generalised to all those with mental illness as those with poorly controlled psychiatric disorders were excluded and this study may have included people taking similar medication for other reasons (e.g. pain or sleep disorders).

O'Brien B, Knight-West O, Walker N, Parag V, Bullen C. E-cigarettes versus NRT for smoking reduction or cessation in people with mental illness: secondary analysis of data from the ASCEND trial. *Tob Induc Dis.* 2015 Mar 24;13(1):5. doi: 10.1186/s12971-015-0030-2.

3. Quit and smoking reduction rates in vape shop consumers: a prospective 12-month survey

- **Study aims**

This study aimed to explore changes in cigarette consumption in smokers making their first purchase at an e-cigarette “vape shop” in Italy, and how e-cigarette use changes over a year. Retail staff from 7 vape shops identified 71 adult smokers making their first purchase and asked them to complete a form detailing demographic and smoking characteristics, as well as providing technical e-cigarette support and advice on use. Prospective follow-up was conducted at 6 and 12 months.

- **Key findings**

After a year, 40.8% of participants reported not having smoked cigarettes in the last 30 days and a further 25.4% had reduced their cigarette consumption by at least half. 33.8% were classified as failures (i.e. those who did not halve their cigarette consumption) – although most of these were participants lost to follow-up and assumed to be still smoking. None of the characteristics reported at baseline were significant predictors of smoking status at follow-up.

There was a trend for moving towards more advanced e-cigarette devices and decreasing nicotine strength over time.

- **Limitations**

This was a small, prospective study with a self-selected, non-representative population, there was no control arm and results rely on self-report.

Vape shop owners could be seen as heavily invested in the outcome and may not have acted as independent researchers. Also, the information given to participants was not standardised.

Polosa R, Caponnetto P, Cibella F, Le-Houezec J. Quit and smoking reduction rates in vape shop consumers: a prospective 12-month survey. *Int J Environ Res Public Health*. 2015; 12(4):3428-38. doi: 10.3390/ijerph120403428.

4. Is exposure to e-cigarette communication associated with perceived harms of e-cigarette secondhand vapour? Results from a national survey of US adults

- **Study aims**

This US study aimed to explore associations between self-reported exposure to e-cigarette advertising, media coverage, and interpersonal discussion and perceived harms of second-hand vapour (SHV) from e-cigarettes. An online survey tool was used with a nationally representative panel however response rate was low and within the final 1449 respondents, ethnic minorities and those with lower education level were under-represented.

- **Key findings**

Overall SHV was perceived as less harmful than second-hand smoke, but respondents perceived SHV as causing moderate levels of harm to one's health and were moderately concerned about the health impact of breathing in SHV. Most people remembered seeing e-cigarette advertising in shops or in broadcast, print or social media in the last 30 days (72.9%), but fewer reported other media exposure (48.2%) and only around 1 in 5 had discussed e-cigarettes with family or close friends.

Those who reported more frequently seeing e-cigarette adverts or other media did not rate perceived harmfulness of SHV significantly differently. However more frequent discussion was associated with lower perceived harm.

Compared to those who could not recall seeing any advertising or had not had any discussions about e-cigarettes in the last 30 days, those who viewed adverts they rated as negative portrayals of e-cigarettes, rated perceived SHV harms significantly higher across all three measures. (Ratings for those who reported seeing other media they felt was negative towards e-cigarettes were only significantly different for one of the three SHV harm measures.)

Other demographic variables were not significantly associated with perceived harm, other than smoking and e-cigarette user status.

- **Limitations**

The study failed to recruit a fully representative sample and very few people remembered seeing negative e-cigarette advertising or media within the past 30 days (less than 4%) so the sample size for this group was small. There was only a small proportion of people within the study who had used e-cigarettes.

There is no way to know what advertising or media people actually saw and what information had influenced their perception of harms of SHV. From this cross-sectional data, it is not possible to know whether baseline attitudes to SHV were improved on or negatively impacted by the media viewed.

Tan AS, Bigman CA, Mello S, Sanders-Jackson A. Is exposure to e-cigarette communication associated with perceived harms of e-cigarette secondhand vapour? Results from a national survey of US adults. *BMJ Open*. 2015;5(3):e007134. doi: 10.1136/bmjopen-2014-007134.

5. [E-cigarettes and smoking cessation: evidence from a systematic review and meta-analysis](#)

- **Study aims**

This study reviewed and synthesised English-language evidence for the role of e-cigarettes in smoking cessation up to May 2014, including RCTs, cohort, case-control and cross-sectional studies. The methodology recommended by the Cochrane Collaboration was used, including quality assessment of studies. Six studies were included, covering 7,551 participants.

- **Key findings**

The review found that the use of e-cigarettes was associated with smoking cessation and harm reduction. The two identified RCTs were combined in a meta-analysis, showing a relative risk for tobacco abstinence with nicotine e-cigarettes compared to nicotine-free e-cigarettes of 2.29 (95% CI: 1.05 – 4.96). Use of e-cigarettes was also associated with a reduction in the number of cigarettes used.

- **Limitations**

Few studies were identified and were heterogeneous in design. Only a comparison to non-nicotine e-cigarettes was possible.

Rahman MA, Hann N, Wilson A, Mnatzaganian G, Worrall-Carter L. E-cigarettes and smoking cessation: evidence from a systematic review and meta-analysis. *PLoS One*. 2015; 10(3):e0122544. doi: 10.1371/journal.pone.0122544

Overview

This month five studies are summarised, one focusing on youth access to e-cigarettes, three focusing on smoking cessation and reduction, and one on e-cigarette marketing and media coverage.

The youth access paper is one of at least 40 studies that have now been published from a number of countries reporting some form of information on the prevalence of e-cigarette use in young people. Although conducted in just one region of England, the sample in this cross-sectional survey is large. Its findings are similar to other papers in that it found that a significant number of smoking teenagers had tried e-cigarettes and some non-smokers had also tried them. However, the single question on e-cigarettes that was included in this survey was 'have you ever tried or purchased e-cigarettes', and the paper does not contain any information on regular use. This type of data on frequency of use as well as "ever use" is essential to assess whether any young people who are not already smokers are regularly accessing e-cigarettes, which is an issue of concern for policy.

The three papers on smoking cessation and reduction all focus on different aspects of this issue and together make some useful additions to the literature. The first looks at a subset of people in the ASCEND trial (one of just two published RCTs of e-cigarettes for smoking cessation) who reported use of medications for mental illness. Its findings are reassuring in that the authors found that the use of 'cigalike' (first generation) e-cigarettes for cessation appeared to be equally effective (and safe and acceptable) for people with mental illness as for those without. The trial and this subsequent analysis had a number of limitations which the authors acknowledge. Adults with mental illness are a priority group for smoking cessation interventions given their high rates of tobacco use. It is important that future studies of e-cigarettes, as well as other smoking cessation interventions, continue to include this group.

The other two cessation papers include a small longitudinal study and a systematic review. The former followed up 71 smokers who made their first purchase of an e-cigarette at vape shops in Italy. As e-cigarettes are currently a consumer product, this type of community based observational study may be useful in describing how the products are used in practice and what the outcomes may be. Its findings are promising but the study did have a very large number of limitations. In contrast, the systematic review provides an additional 'lens' to look at a number of e-cigarette studies in conjunction with one another. Its findings are similar to the recently published [Cochrane review](#) of e-cigarettes for cessation and reduction, in that a narrative synthesis of the six studies and a meta-analysis of the two RCTs included found some evidence that use of the variety of e-cigarettes included in the studies was associated with cessation and reduction. This review differed from the Cochrane review in timing (its cut off was earlier, May compared to July 2014) and inclusion criteria. It reviewed the same two RCTs as Cochrane and also included two of the same cohort studies, but not other cohort studies that were covered by Cochrane. It also included two cross-sectional studies whereas the Cochrane review excluded these. Interested readers should consult this new review alongside the Cochrane review.

Finally, there is considerable current debate regarding the role of media coverage of e-cigarettes, and e-cigarette marketing, in shaping public perceptions. One paper included here used well-established methods to assess whether recall of these types of communications in a cross-sectional survey influenced attitudes towards perceived harm from e-cigarette 'second hand' vapour (SHV). It also looked at how reported conversations with others about e-cigarettes affected harm perceptions. Overall, the sample of American adults had low levels of exposure to marketing, media and discussing e-cigarettes. There was a more consistent effect identified with negative information on SHV, which is in line with previous communications research suggesting that 'aversive' information may be more memorable than positive information particularly in groups with low levels of awareness. Although this study is quite descriptive and preliminary, it is interesting particularly in a UK context. While genuine concern exists about e-cigarette promotion, less attention is perhaps

given to the impact of information on risks in the media or elsewhere. This is also a legitimate topic for study, with potential implications for e-cigarette use, regulation and policy.

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

- [Nicotine content of electronic cigarettes, its release in vapour and its consistency across batches: regulatory implications](#)
- [Nicotine Levels and Presence of Selected Tobacco-Derived Toxins in Tobacco Flavoured Electronic Cigarette Refill Liquids.](#)
- [Nicotine and toxicant yield ratings of electronic cigarette brands in New Zealand](#)
- [Cigarette smokers' use of unconventional tobacco products and associations with quitting activity: findings from the ITC-4 U.S. cohort](#)
- [Adolescent Electronic Cigarette Use: Associations With Conventional Cigarette and Hookah Smoking](#)
- [The effect of electronic cigarette advertising on intended use among college students](#)
- [E-cigarette awareness and perceived harmfulness: prevalence and associations with smoking-cessation outcomes](#)
- [How U.S. adults find out about electronic cigarettes: implications for public health messages](#)
- [Non-combustible tobacco product advertising: how companies are selling the new face of tobacco](#)
- [Evaluation of e-cigarette liquid vapor and mainstream cigarette smoke after direct exposure of primary human bronchial epithelial cells](#)
- [Influence of inhaled nicotine source on arterial stiffness](#)

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 UKERC key questions are identified. Only peer-reviewed primary studies and systematic reviews are included – commentaries will not be included. Please note that 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.

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