

THE UK ELECTRONIC CIGARETTE RESEARCH FORUM

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Electronic Cigarette Research Briefing – February 2020

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.

You can find our previous research briefings at www.cruk.org/UKECRF.

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

1. [Nicotine delivery and users' reactions to Juul compared with cigarettes and other e-cigarette products.](#)

- **Study Aims**

This UK cross-over study funded by Cancer Research UK compared the nicotine delivery and user experience of Juul e-cigarettes and conventional cigarettes in dual users (n=20). After overnight abstinence, participants smoked their usual brand cigarette freely for 5 minutes. After a second overnight abstinence, participants vaped a 59mg/ml nicotine Juul e-cigarette. Blood nicotine levels at baseline and 2, 4, 6, 8, 10 and 30 minutes were recorded, and participants rated their urges to smoke and opinions of the product. In 8 participants, data on their own brand of e-cigarette was also available.

- **Key Findings**

Compared with cigarettes, there was no significant difference in the maximum concentration of blood nicotine reached (C_{max}) for Juul ($p=0.76$). There was also no difference in the median time taken to reach maximum nicotine concentration (T_{max}) ($p=0.051$) or in total nicotine delivery over 30 minutes, ($p=0.051$).

There was no significant difference in the mean number of puffs taken over the 5 minutes between Juul and cigarettes ($p=0.15$). When using Juul, participants took fewer puffs on average compared with their own brand of e-cigarette, however this did not reach statistical significance (12.5 versus 17, $p=0.084$).

Compared with cigarettes, there was no significant difference in rating of Juul in relieving the urge to smoke ($p=0.002$), time taken for effect ($p=0.4$), nicotine delivery ($p=0.34$), taste ($p=0.17$) or pleasantness ($p=0.21$).

Compared with other e-cigarettes, the maximum blood nicotine concentration reached was significantly higher for Juul [$C_{\max}=28.9$ (SD=15.6) versus 10.6 (SD=5.5), $p=0.013$]. Total nicotine delivery was also greater for Juul ($p=0.019$). The maximum blood nicotine concentration was reached faster with Juul [$T_{\max}=4$ mins (IQR=2.5-4.0) versus 6.3 mins (IQR=4.7-8.1), $p=0.012$].

Compared with other e-cigarettes, participants rated Juul as more pleasant ($p=0.026$) and were more likely to recommend the product to friends ($p=0.003$). There was no significant difference in rating of relieving the urge to smoke ($p=0.09$), nicotine delivery ($p=0.67$) and taste ($p=0.64$).

- **Limitations**

The sample size was small which increases the uncertainty of estimates. Therefore, the study may not have been able to detect statistical significance in some analysis due to low power. The sample also largely consisted of males so it may not be representative of the population.

The order of testing could not be randomised meaning that an order effect cannot be ruled out.

The effects of Juul/cigarettes were only measured on one occasion in dual users. Longer term follow-up studies are required to determine if the effects of Juul are sustained over time, or in participants who solely use e-cigarettes.

Although all used e-cigarettes, data on other e-cigarettes was only available for 8 participants. Data on different types of e-cigarette were combined and averaged, despite differences in the products.

The study only examined a tobacco flavoured Juul product, so the effects of other flavours could not be determined. Participants freely used their own cigarettes, Juul and other e-cigarettes, so the study does not provide information on nicotine intake per puff.

Hajek P, Pittaccio K, Pesola F, Myers Smith K, Phillip-Waller A, Przulj D. (2020). [Nicotine delivery and users' reactions to Juul compared with cigarettes and other e-cigarette products](#). *Addiction*.; doi: 10.1111/add.14936

2. [Communicating the relative health risks of E-cigarettes: An online experimental study exploring the effects of a comparative health message versus the EU nicotine addiction warnings on smokers' and non-smokers' risk perceptions and behavioural intentions.](#)

- **Study Aims**

This UK study funded by Cancer Research UK randomised 2495 adults (aged 18+) (n=1283 smokers; n=1212 non-smokers) to view one of six messages accompanying images of e-cigarettes (ECs). These were:

- no message
- One of two tobacco products directive (TPD) warnings: *"This product contains nicotine which is a highly addictive substance. [+ It is not recommended for non-smokers]"*
- A comparative harm message (COMP): *'Use of this product is much less harmful than smoking'*
- TPD + COMP

Perceptions of and intentions to use or purchase ECs were examined before and after exposure on a 7-point Likert scale. The initial analysis examined differences in outcomes between smoking status, TPD and COMP exposure. Results were adjusted for perceptions and intentions before exposure.

- **Key Findings**

In both smokers and non-smokers, participants reported lower harm perception scores following exposure to the COMP message alone compared to the TPD alone (smokers, M=4.55 vs 4.89, $p=0.001$. non-smokers, M=5.45 vs 5.66, $p=0.002$).

Compared to no message, viewing the COMP message alone resulted in reduced harm perceptions in smokers (M=4.55 vs 4.76, $p=0.034$) but not non-smokers ($p=0.15$).

In both smokers and non-smokers, there were lower harm perception and addictiveness scores following exposure to COMP alone compared to the TPD + COMP (p values <0.02).

There were no significant differences in perceptions of effectiveness or social acceptability when comparing TPD + COMP message with TPD alone or TPD + COMP with no message.

Smokers who were exposed to the COMP message alone reported greater intention to purchase an EC in the next month compared to those exposed to the TPD alone (M=2.64 vs 2.44, $p=0.049$) however non-smokers did not ($p=0.582$). For the same comparison, neither smokers ($p=0.582$) nor non-smokers ($p=0.378$) reported a greater intention to purchase an EC in six months, or use an e-cigarette in the next month.

Overall, TPD presence reduced intentions to quit in smokers ($p=0.022$). However, there was no significant difference in intention to quit next month or in six months or to use an e-cigarette to quit in the next month or in six months when comparing any individual health message exposures. There was also no overall effect observed for COMP presence ($p=0.278$).

- **Limitations**

The study focuses on the intentions of participants. Therefore, it is unclear whether these intentions regarding e-cigarettes would be converted into actions.

Participants were presented with the messages in a controlled situation rather than shown adverts in a real-life environment and the effect of the message in these scenarios may differ.

The pair comparisons were not adjusted for demographics, cigarette dependence or previous e-cigarette exposure. Prior smoking history was not considered among non-smokers. Therefore, they may be subject to confounding.

Occasional and regular smokers were combined in the analysis as “smokers” however may have different attitudes to tobacco products.

Participation required voluntary completion of the survey and dual users were excluded. Therefore, the results may not be generalisable to the wider smoking population.

A full analysis of between-factors ANCOVAs (primary analysis and secondary analysis adjusted for cigarette dependence, previous cigarette exposure and baseline intentions to quit) was not presented in the results. Therefore, it is unclear which main effects are present for each perception/intention measured.

Kimber C, Frings D, Cox S et al. (2020). [Communicating the relative health risks of E-cigarettes: An online experimental study exploring the effects of a comparative health message versus the EU nicotine addiction warnings on smokers' and non-smokers' risk perceptions and behavioural intentions](#). *Addictive Behaviour*.; doi: 10.1016/j.addbeh.2019.106177

3. [Socioeconomic patterning of vaping by smoking status among UK adults and youth](#).

- **Study Aims**

This UK study reviewed data from 3291 young people (aged 10-15) and 35,367 adults (16+) in the UK Household Longitudinal Study between 2015-2017. The association of socioeconomic position (SEP) of vaping status (any current use) with smoking status in young people (never vs ever smokers) and adults (never vs ex vs current smokers) was examined by calculating the increased risk of vaping for every unit increase in socioeconomic index. Socioeconomic inequalities in ex-smoking between vaping status were also examined.

- **Key Findings**

Among never smokers, the likelihood of vaping in young people differed across single parent status ($p < 0.001$), parental occupation categories ($p < 0.001$) and income ($p = 0.002$). None of these associations were significant in current-smokers.

Overall, disadvantaged young people were more likely to vape (OR=1.16, 95% CI= 1.06-1.28). There was no significant difference in effect of SEP on likelihood of vaping in ever smokers and never smokers ($p = 0.380$)

In adults, across all smoking statuses, the likelihood of vaping differed across occupation groups (never smokers, $p = 0.018$, ex-smokers, $p < 0.001$, current smokers, $p < 0.001$). In ex and current

smokers, the likelihood of vaping differed across income levels (current smokers, $p=0.016$, ex-smokers, $p=0.002$) however in never smokers it did not ($p=0.481$).

Overall, disadvantaged adults were more likely to vape ($OR=1.04$, $95\%CI=1.04-1.07$). There was a significantly greater effect of SEP observed in ex-smokers than never smokers ($p<0.001$) but no significant difference observed between current smokers and never smokers ($p=0.0781$).

Overall, more disadvantaged adults were less likely to be ex-smokers ($OR=0.87$, $95\%CI = 0.85-0.88$). There was no significant difference in effect of SEP on ex-smoking status among vapers compared with non-vapers ($p=0.081$).

- **Limitations**

Although marginal structural models were used to mitigate against collider bias, this technique relies on all potential confounding variables being accounted for and weighted correctly.

Vaping status was binary and was determined by asking “do you ever use electronic cigarettes”. Therefore, occasional users would have been categorised as users. Similarly, smoking status in the analysis on youth was also binary. As it is common for young people to try e-cigarettes or cigarettes without using them regularly, this may have impacted the associations seen

The study did not examine trends in cessation, only “ex-smokers”. Therefore, Therefore, it cannot tell us about patterns of use in individuals over time, or determine causality.

This study did not consider dual use patterns or past e-cigarette use by socio-economic status which could have influenced the associations observed.

The youth category was defined as aged 10-15 and adults 16+. If youth had been grouped as 16-18-year olds, different associations may have been found.

Green MJ, Gray L, Sweeting H, Benzeval M. [Socioeconomic patterning of vaping by smoking status among UK adults and youth.](#) (2020). *BMC Public Health.*; doi: 10.1186/s12889-020-8270-3.

4. [Electronic cigarettes and obstetric outcomes: a prospective observational study](#)

- **Study Aims**

This prospective Irish study examined mean infant birthweight, gestation at delivery and incidence of low birthweight in pregnant women who were exclusive e-cigarette (EC) users ($n=218$) compared with dual users ($n=195$), smokers ($n=99$) and non-smokers ($n=108$). Data were patients’ hospital records and were collected by midwives on their first visit. The analysis was controlled for age, parity, socioeconomic status and ethnicity.

- **Key Findings**

There was no statistical difference between the mean birthweight of infants born to EC users compared with non-smokers ($3470g\pm555g$ vs $3471\pm504g$, $p<0.001$). Infants born to EC users had significantly higher birth weights than those born to smokers ($3470g\pm555g$ vs 3166 ± 502 , $p<0.001$) and dual-users ($3470g\pm555g$ vs 3140 ± 628 , $p<0.001$).

Significantly fewer infants born to EC users had a birthweight in the <10th centile compared with smokers (11% vs 28%, $p<0.001$) and dual users (11% vs 30.7%). There was no statistical difference when comparing infants born to EC users and non-smokers (11% vs 12.9%, $p=0.6$).

There was no significant differences in admissions of infants to newborn intensive care units across different maternal vaping/smoking statuses.

EC users were more likely to have a planned pregnancy and have taken preconceptional folic acid compared with dual users, smokers and non-smokers ($p<0.019$). EC users were also significantly more likely to be breastfeeding at discharge compared with dual users ($p<0.001$), smokers ($p<0.001$) and non-smokers ($p=0.03$).

- **Limitations**

Data on EC and cigarette use were collected only once, in the mother's first visit to the centre which usually falls in the early second trimester. It is possible that participants changed their smoking/vaping behaviour later in pregnancy which may have impacted results.

Whilst the study reports similar obstetric outcomes between dual users and smokers, the statistical analysis did not directly compare these groups meaning a significant effect cannot be determined.

Whilst the analysis adjusted for age, parity, socioeconomic status and ethnicity, it did not adjust for other variables such as maternal BMI, maternal illnesses or length of pregnancy. Therefore, the results may be subject to confounding.

All data was self-reported. Smoking status was not verified by CO testing and non-disclosure of smoking status during pregnancy is common. The rate of "never smokers" using an EC was 8.4%, a figure which is much higher than in the non-pregnant population. This could suggest non-disclosure of smoking in the EC group which would have affected results.

McDonnell BP, Dicker P, Regan CL. (2020). [Electronic cigarettes and obstetric outcomes: a prospective observational study](#). *BJOG*;doi: 10.1111/1471-0528.16110.

Overview

This month we include three papers from research teams based in England and a fourth from Ireland.

The first paper aimed to assess user's reactions to Juul, a cartridge-based e-cigarette, and its pharmacokinetic (PK) profile. Funded by Cancer Research UK, this study involved twenty mostly male volunteers between the ages of 27 and 41 who were daily vapers and smoked at least occasionally (dual users). They were asked to abstain from both smoking and vaping overnight and visited the lab in the morning on two occasions. During the first visit they smoked a cigarette for five minutes and had blood samples taken at baseline and then at intervals up to 30 minutes after starting smoking. On the second visit they repeated these procedures but used a Juul, with high nicotine strength of the type available in the USA (59mg). Eight of the participants had taken part in a [previous study](#) conducted by the same research team, where the same procedures were used to examine other types of e-cigarettes.

The study found that Juul's PK profile was very similar to cigarettes and different from other e-cigarettes. Nicotine delivery from the high strength Juul was similar to that obtained from smoking.

Compared with other types of e-cigarettes with data from the eight users mentioned above, Juul provided better nicotine delivery, better reduction of urges to smoke and was rated as more pleasant. Study participants reported that they would be more likely to recommend Juul to friends than the other e-cigarettes. This study adds to existing evidence about the evolution of types of vaping products. Over time, the products have developed to deliver nicotine more effectively, but until the advent of Juul most e-cigarettes did not have a PK profile similar to cigarettes. As the authors point out, this is likely to assist with smoking cessation for those switching to Juul (effectively reducing cravings and withdrawal symptoms) but could result in more addictive potential among non-smokers. To date, use of Juul in the UK (as reported by the [Smoking Toolkit Study](#)) is modest as a portion of all e-cigarette use, in contrast to the USA where JUUL has been highly [popular in recent years](#). The difference in nicotine content permitted in the UK and Europe compared with the US version tested in this study may be one factor contributing to these differences.

This month's second study was also funded by CRUK and examined the effect of health warnings on e-cigarette packaging. The EU Tobacco Products Directive requires member states to use a text warning covering 30% of the pack that states either "This product contains nicotine which is a highly addictive substance" or "This product contains nicotine which is a highly addictive substance. It is not recommended for use by non-smokers". The study authors set out to explore smokers and non-smokers reactions to these warnings compared with no message or a 'comparative harm message' (COMP) developed in a [linked pilot study](#). The COMP stated "Use of this product is much less harmful than smoking". This could also be described as a message about the relative risk of vaping vs smoking.

A market research company recruited just under 2,500 adults to participate in an online survey where the messages were tested using questions developed by the research team. Around half were smokers and the other half non-smokers. Each participant answered a range of demographic and e-cigarette related questions (harm, addictiveness, effectiveness and social acceptability of e-cigarettes, intention to purchase and use and, for smokers, quit intentions). They were then randomised to view different messages (one of the two TPD messages, COMP, the first TPD message plus COMP, the second TPD message + COMP, or no message at all). In the analysis, scores for responses to the two TPD messages were combined as they did not differ.

The study found that harm perceptions were greater in those exposed to the TPD message compared to those who were not. In contrast, e-cigarettes were perceived as less harmful when shown the COMP message, but only after adjustment for additional factors. There were some interesting differences between smokers and non-smokers with regard to the COMP message. For smokers it improved their views regarding e-cigarettes compared to the TPD and no pack message. For non-smokers this was the case only for the COMP message compared with the TPD message and not no pack message. The authors speculated, therefore, that a 'relative risk' message of the type used in this study may reduce smoker's harm perceptions, but do little to change non-smoker's perceptions, perhaps because relative risk messages are not seen as directly relevant to them in the first place. Findings regarding intention to purchase and use an e-cigarette, and to quit smoking (in smokers) varied depending on the message viewed and the question asked. Overall, however, there were promising signs that a 'relative risk' message would increase smoker's intentions to purchase an e-cigarette and to intend to quit in the next month, particularly when included as a stand-alone message on e-cigarette packaging. It remains to be seen whether any EU regulations that apply to e-cigarettes will change in the UK following Brexit, but a review of these is planned in future years. This study provides interesting evidence about smokers and non-smokers responses to the health warning element of these regulations.

Our third study is a secondary analysis of a large cross-sectional survey, the [UK Household Longitudinal Survey](#) (wave 7, 2015-17). The authors were interested in exploring differences in vaping and smoking by socio-economic status. As smoking is an important cause of inequalities in health, they set out to examine how socio-economic position (SEP) was associated with vaping in different groups in the population. Three research questions were posed: 1) whether vaping is associated with SEP among youth and does it vary by smoking status; 2) whether vaping is associated with SEP among adults and how this varies by smoking status; and 3) whether socio-economic inequalities in ex-smoking are smaller for ever-smoking adults who vape, compared with those who don't. The study included just over 3,000 young people aged 10-15 and just over 35,000 adults aged 16 and over. Vaping status was assessed by a very simple question - "Do you ever use e-cigarettes" and those that responded yes were classified as current vapers. The assessment of smoking status was limited to current, ex or never smokers (and ever or never smokers for young people). SEP was measured by an index comprising educational level, occupational status and net income (based on household measures).

The prevalence of vaping was low in the overall sample of both young people (3.4%, n=112) and adults (7.4%, n=2,2624) and very low among never smokers (young people 1.4%, n=42, adults 1.1%, n=189). Findings in relation to the three research questions were as follows. For question 1) the analysis found that vaping was more common among disadvantaged young people, especially among youth who had never smoked. For question 2) an adjusted analysis found that disadvantage increased the likelihood of vaping among adult ex-smokers but there was no significant effect of SEP on vaping among current or never smokers. For question 3) the study found a slightly weaker effect of SEP among adult ever smokers who vaped compared to those who didn't. These findings have a number of potential implications. Although the numbers are tiny and must be treated with caution, the patterns in never smoking youth need further monitoring, because those from disadvantaged households had a higher risk of vaping. This could widen inequalities in health if these young people subsequently go onto smoke - or narrow them if these young people are vaping instead of smoking. For adults, the study suggest that vaping may be supporting smoking cessation among disadvantaged adults, which could have positive implications for reducing inequalities in health.

The final study this month was conducted by a team of maternal health experts in the Republic of Ireland. They were interested in comparing pregnancy and birth outcomes in e-cigarette users compared with smokers and non-smokers. To date the literature on vaping during pregnancy is very modest, despite the fact that [studies from the UK](#) and the USA in particular have found that some pregnant women [do choose to use e-cigarettes](#). The study used routine data collected from women at maternity booking and then examined differences in three main outcomes at the end of pregnancy - birthweight, gestation (weeks of pregnancy) at delivery and the incidence of low birthweight, along with other outcomes including breastfeeding at the time of discharge from the maternity hospital. At booking, vapers were those who self-reported that they currently vaped (simple yes or no answer), smokers were those who self-reported smoking at least one cigarette per day, and non-smokers were those who reported they never smoked. If a woman reported vaping and smoking she was classified as a dual user. The records of 620 women were included in the analysis - 218 exclusive vapers, 195 dual users, 99 smokers and 108 non-smokers.

After accounting for some relevant confounders in the analysis, the authors found that babies born to women who exclusively vaped had a similar birthweight to those born to non-smokers. Birthweight was lower in the smoking group, [as previous studies have found](#). The mean birthweight of babies born to dual users was similar to that for smokers, suggesting that continued smoking even at reduced levels was affecting the growth of the baby during pregnancy. Lower birth weight babies

are [at risk of a range of conditions](#) in infancy and in the longer term. Gestation at delivery was similar across all the groups in the study, which differs from some previous studies that have found [premature birth is more common among smokers](#). Exclusive vapers had higher breastfeeding rates at the time of leaving hospital than smokers, although not higher than non-smokers.

Other studies from February you might find of interest:

Patterns of Use

[Which smokers adopt e-cigarettes and at what price? An experimental estimation of price elasticity of demand and factors correlated with e-cigarette adoption.](#)

[Socioeconomic patterning of vaping by smoking status among UK adults and youth.](#)

[Use of Electronic Cigarettes in Smoke-Free Spaces by Smokers: Results from the 2014-2015 Population Assessment on Tobacco and Health Study.](#)

[Comparison of the Relative Abuse Liability of Electronic Cigarette Aerosol Extracts and Nicotine Alone in Adolescent Rats: A Behavioral Economic Analysis.](#)

[Factors Associated with Electronic Cigarette Use among Young Adults: The French "Trajectoires EpidéMiologiques en POpulation" \(TEMPO\) Cohort Study.](#)

[Spirituality, Ethnic Identity, and Substance Use among American Indian/Alaska Native Adolescents in California.](#)

[Nicotine delivery and users' reactions to Juul compared with cigarettes and other e-cigarette products.](#)

[Changes in Flavor Preference in a Cohort of Long-term Electronic Cigarette Users.](#)

[Associations of Socioeconomic Status, Parental Smoking and Parental E-Cigarette Use with 10-11-Year-Old Children's Perceptions of Tobacco Cigarettes and E-Cigarettes: Cross Sectional Analysis of the CHETS Wales 3 Survey.](#)

[Association Between E-cigarette Use and Depression in US Adults.](#)

[Flavor Preference and Systemic Immunoglobulin Responses in E-Cigarette Users and Waterpipe and Tobacco Smokers: A Pilot Study.](#)

[Electronic Cigarette and JUUL Use Among Adolescents and Young Adults.](#)

[E-Cigarette Use by Smoking Status in Estonia, 2012-2018.](#)

[Tobacco and electronic cigarette cues for smoking and vaping: an online experimental study.](#)

[Youth Vaping and Tobacco Use in Context in the United States: Results from the 2018 National Youth Tobacco Survey.](#)

[Body esteem, weight control outcome expectancies, and e-cigarette use among young adults.](#)

[Population-level predictors of changes in success rates of smoking quit attempts in England: a time series analysis.](#)

Perception

[From the Deeming Rule to JUUL-US News Coverage of Electronic Cigarettes, 2015-2018.](#)

[Using the intervention ladder to examine policy influencer and general public support for potential tobacco control policies in Alberta and Quebec.](#)

[A multimodal assessment of tobacco use on a university campus and support for adopting a comprehensive tobacco-free policy.](#)

[Support for Aggressive Tobacco Control Interventions Among California Adolescents and Young Adults.](#)

[Harm perceptions of e-cigarettes among smokers with and without mental health conditions in England: A cross-sectional population survey.](#)

[Flavor Preference and Systemic Immunoglobulin Responses in E-Cigarette Users and Waterpipe and Tobacco Smokers: A Pilot Study.](#)

[Sex differences in the appeal of flavored e-cigarettes among young adult e-cigarette users.](#)

[Perceptions and Sentiments About Electronic Cigarettes on Social Media Platforms: Systematic Review.](#)

[Communicating the relative health risks of E-cigarettes: An online experimental study exploring the effects of a comparative health message versus the EU nicotine addiction warnings on smokers' and non-smokers' risk perceptions and behavioural intentions.](#)

Cessation

[Nicotine patches with e-cigarettes for smoking cessation.](#)

[Association between electronic cigarette use and smoking cessation in the European Union in 2017: analysis of a representative sample of 13 057 Europeans from 28 countries.](#)

[Changes in Nicotine Product Use among Dual Users of Tobacco and Electronic Cigarettes: Findings from the Population Assessment of Tobacco and Health \(PATH\) Study, 2013-2015.](#)

[Is the use of e-cigarettes for smoking cessation associated with alcohol consumption? A population-level survey of successful quitters in England.](#)

Youth

[High school students rarely use e-cigarettes alone: A socio-demographic analysis of poly-substance use among adolescents in the USA.](#)

[Prevalence of Electronic Cigarette Use Among Adolescents in New Jersey and Association With Social Factors.](#)

[Age-varying associations between e-cigarette use and peer use, household use, and exposure to e-cigarette commercials among alternative high school students in Southern California.](#)

[Who Uses Tobacco Products? Using Peer Crowd Segmentation to Identify Youth at Risk for Cigarettes, Cigar Products, Hookah, and E-Cigarettes.](#)

[Novel tobacco products including electronic cigarette and heated tobacco products increase risk of allergic rhinitis and asthma in adolescents: Analysis of Korean youth survey.](#)

[Exposure to Secondhand Aerosol From Electronic Cigarettes Among US Youth From 2015 to 2018.](#)

[Use of e-cigarettes and smoked tobacco in youth aged 14-15 years in New Zealand: findings from repeated cross-sectional studies \(2014-19\).](#)

[Adolescents' interpretations of e-cigarette advertising and their engagement with e-cigarette information: results from five focus groups.](#)

Harms and Harm Reduction

[Inflammatory Biomarkers and Growth Factors in Saliva and Gingival Crevicular Fluid of E-cigarette users, Cigarette smokers, and Dual smokers: A pilot study.](#)

[The oral health impact of electronic cigarette use: a systematic review.](#)

[E-cigarettes: Effects in phagocytosis and cytokines response against Mycobacterium tuberculosis.](#)

[Electronic cigarettes and obstetric outcomes: a prospective observational study.](#)

[Profiling the Acute Effects of Modified Risk Products: Evidence from the SUR-VAPES \(Sapienza University of Rome-Vascular Assessment of Proatherosclerotic Effects of Smoking\) Cluster Study.](#)

[The Health Risks of Electronic Cigarettes Use in Adolescents.](#)

[Effects of Exposure to Tobacco Cigarette, Electronic Cigarette and Heated Tobacco Product on Adipocyte Survival and Differentiation In Vitro.](#)

[PBPK modeling characterization of potential acute impairment effects from inhalation of ethanol during e-cigarette use.](#)

[The Evolving Landscape of Electronic Cigarettes: A systematic review of recent evidence.](#)

[Novel tobacco products including electronic cigarette and heated tobacco products increase risk of allergic rhinitis and asthma in adolescents: Analysis of Korean youth survey.](#)

[The effects of vaping electronic cigarettes on periodontitis.](#)

[Nicotine exposure potentiates lung tumorigenesis by perturbing cellular surveillance.](#)

[Hypomethylation of LINE-1 repeat elements and global loss of DNA hydroxymethylation in vapers and smokers.](#)

[Comparison of self-rated oral symptoms and periodontal status among cigarette smokers and individuals using electronic nicotine delivery systems.](#)

[Is E-cigarette use a gateway to marijuana use? Longitudinal examinations of initiation, reinitiation, and persistence of e-cigarette and marijuana use.](#)

[Negative health symptoms reported by youth e-cigarette users: Results from a national survey of US youth.](#)

[A 6-month systems toxicology inhalation study in ApoE-/- mice demonstrates reduced cardiovascular effects of E-vapor aerosols compared to cigarette smoke.](#)

[Adult Social Environments and the Use of Combustible and Electronic Cigarettes: Opportunities for Reducing Smoking in the 30s.](#)

[Vaping effects on asthma: results from a web survey and clinical investigation.](#)
[Association Between Electronic Cigarette Use and Levels of High-Sensitivity C-Reactive Protein and Uric Acid.](#)

[Determination of Thermal Decomposition Products Generated from E-Cigarettes.](#)

[Electronic Cigarette \(E-Cigarette\) Vapor Exposure Alters the Streptococcus pneumoniae Transcriptome in a Nicotine-Dependent Manner without Affecting Pneumococcal Virulence.](#)

[Assessing the hazard of E-Cigarette flavor mixtures using zebrafish.](#)

[Systemic toxicity evaluation of novel tobacco products in Caenorhabditis elegans.](#)

Marketing

[Availability and advertising of electronic cigarettes in two Russian cities following implementation of comprehensive tobacco advertising restrictions.](#)

[Cartoon images on e-juice labels: A descriptive analysis.](#)

[Do tobacco industry websites target content to specific demographic groups?](#)

[Peer crowd-based targeting in E-cigarette advertisements: a qualitative study to inform counter-marketing.](#)

Misc

[Acute effects of JUUL and IQOS in cigarette smokers.](#)

[Comprehensive overview of common e-liquid ingredients and how they can be used to predict an e-liquid's flavour category.](#)

[Online Information on Electronic Cigarettes: Comparative Study of Relevant Websites From Baidu and Google Search Engines.](#)

[Determining the impact of flavored e-liquids on aldehyde production during Vaping.](#)

[How do colleges communicate about E-cigarettes? The presentation of risk, policy, and cessation resources on college websites.](#)

[Behavior-based yield for electronic cigarette users of different strength e liquids based on natural environment topography.](#)

[Impact of the revised European Tobacco Product Directive on the quality of e-cigarette refill liquids in Belgium.](#)

[Examination of a mouthpiece-based topography device for assessing relative reinforcing effects of e-cigarettes: A preliminary study.](#)

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 ecig[title/abstract] OR (nicotine AND (vaporizer OR vaping 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 Alice Davies and Sophia Lowes from Cancer Research UK with assistance from Professor Linda Bauld at the University of Edinburgh and the UK Centre for Tobacco and Alcohol Studies, primarily for the benefit of attendees 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.