Electronic Cigarette Advertising Impacts Adversely on Smoking Behaviour Within a London Student Cohort: A Cross-Sectional Structured Survey

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Abstract

Introduction In contrast to tobacco smoking, electronic cigarette (“vaping”) advertisement had been approved in the United Kingdom (UK) in January 2013. Currently, there are an estimated 3.2 million UK e-cigarette users. The impact of e-cigarette advertisement on tobacco use has not been studied in detail. We hypothesised that e-cigarette advertisement impacts on conventional smoking behaviour.

Methods A cross-sectional structured survey assessed the impact of e-cigarette advertising on the perceived social acceptability of cigarette and e-cigarette smoking and on using either cigarettes or e-cigarettes (on a scale of 1 to 5/’not at all’ to ‘a lot’). The survey was administered between January to March 2015 to London university students, before and after viewing 5 UK adverts including a TV commercial.

Results Data were collected from 106 participants (22 ± 2 years, 66% male), comprising cigarette smokers (32%), non-smokers (54%) and ex-smokers (14%). This included vapers (16%), non-vapers (77%) and ex-vapers (7%). After viewing the adverts, smokers (2.6 ± 1.0 vs. 3.8 ± 1.1, \(p = 0.001\)) and non-smokers (3.2 ± 0.7 vs. 3.7 ± 0.8, \(p = 0.007\)) felt smoking was more socially acceptable, compared to before viewing them. Participants were more likely to try both e-cigarettes (1.90 ± 1.03 to 3.09 ± 1.11, \(p < 0.001\)) and conventional cigarettes (1.73 ± 0.83 to 2.27 ± 1.13, \(p < 0.001\)) after viewing the adverts compared to before. Vapers were less likely to smoke both an e-cigarette, and a conventional cigarette after viewing the adverts.

Conclusion E-cigarette advertising encourages both e-cigarette and conventional cigarette use in young smokers and non-smokers. The adverts increase the social acceptability of smoking without regarding the importance of public health campaigns that champion smoking cessation.

Keywords E-cigarette · Tobacco · Smoking · Public health

Introduction

The development of e-cigarettes, otherwise known as vapourisers, has led to the delivery of inhaled nicotine without tobacco through a vapourised solution via battery-operated devices [1]. Since their introduction in China in 2004 and in the United States of America in 2007, e-cigarettes...
have become widely available, and their use has risen exponentially [2]. Currently, there are an estimated 3.2 million adults in Great Britain using e-cigarettes [3]. Despite this figure, many unanswered questions about their safety, efficacy for harm reduction and impact on smoking cessation remain [4, 5]. Further, over a third of current e-cigarette users do so alongside the use of conventional cigarettes [3], putting the overall efficacy of e-cigarettes for smoking cessation into question.

Importantly, e-cigarette advertising remains an area of great controversy. While tobacco products that do not claim to have health benefits are subject to licensing by the European Tobacco Products Directive (TPD) [6], in the United Kingdom those that do claim to have health benefits are subject to licensing by the Medicine and Health Regulatory Authority (MHRA) [7]. This has important implications as significant differences exist between the two forms of licensing with respect to tobacco products.

Compared to TPD licensing, MHRA regulation leads to lower taxation (5% VAT vs 20% VAT) and no enforcement of package warning labels. It also means that the products are available on prescription and importantly, that there is greater flexibility in advertising; this includes cross-border advertising, television commercials and use of billboard and buses [7].

Since the MHRA decided to regulate e-cigarettes as medicinal products, as with any ‘over the counter’ medication, they were granted the right to advertise. In light of this, the Committee on Advertising Practise (CAP) implemented new guidelines for the advertisement of e-cigarettes [8].

In August 2015, Public Health England released a statement to the media suggesting that e-cigarettes are 95% less harmful than conventional cigarettes [9], but there remains a controversy as this statement was met with scepticism from international high-impact factor journals [10, 11] questioning the validity and strength of the data they had cited.

Independent of any potential harm of e-cigarettes, this study focused on the perception and response to e-cigarette adverts. We hypothesised that e-cigarette advertising may encourage the use of e-cigarettes and conventional cigarettes in smokers and non-smokers.

Methods

The study was approved by the local university research ethics committee, and was performed at Kingston University (KU) and St George’s, University of London (SGUL), during a three-week period from 2nd March to the 20th March 2015. Written informed consent was obtained prior to participation. Inclusion criteria were fluent English, student, age 18–80 years and both genders. Those who were unable to communicate, understand or view the questionnaire or participant information sheets were excluded.

Structured Survey

A 17-item structured survey was designed following an internal peer-review process from four academic institutions (Guys and St Thomas’ NHS Foundation Trust, King’s College London and St George’s, University of London and Kingston University). A university student population was used as university students/young adults, who are at a unique stage of experimentation and peer influence [12], are at particular risk of smoking initiation [13].

The survey assessed demographics to assess for baseline confounders, smoking risk awareness and perceptions on whether “e-cigarettes are an effective means of helping people to stop smoking tobacco cigarettes” (on a scale of 1/“strongly disagree” to 5/“strongly agree”).

Awareness of the following smoking-related health risks were assessed in each participant to determine whether they influenced the intention to smoke a conventional cigarette after viewing the advertising:

- Early menopause [14], fertility [15], ageing [16], rheumatoid arthritis [17], sexual dysfunction [18], chronic obstructive pulmonary disease (COPD) [19], lung cancer [20], blindness [21], strokes [22] and heart disease [23].

Participant’s intention to smoke a conventional cigarette, as well as an e-cigarette was elicited (“how much do you want to try a cigarette/e-cigarette”, on a scale of 1/“not at all” to 5/“a lot”) prior to, and following, viewing five different UK e-cigarette adverts. Participants were further asked how they would prefer e-cigarettes to be regulated.

A structured survey was chosen as the assessment tool, as this was deemed to be the most efficient way to collate the above information, and to evaluate the instant psychological influence of e-cigarette advertising on the intention to use cigarettes or e-cigarettes. Although the dimension of “intention” is thought to have a low correlation with the dimension “action”, “intention” measurements are widely used in this context [24–26] and “intention to smoke” is considered an important predictor of smoking behaviour, as it is included in various health and social psychology theories [25, 26].

Advertisements Shown

Five images of recent e-cigarette advertisements were utilised, each focussing on different messages: ‘a healthier option to smoking’, ‘beating the smoking ban laws’, ‘no need to quit smoking’ (please refer to Online Supplement Fig. E1). These are typical messages found in e-cigarette advertising, as shown in recent content reviews [27–29].
Sample Size Analysis

We assumed a minimal mean difference in the overall “intention to smoke” a conventional cigarette, after viewing the e-cigarette advertising, to be 0.5 (on a scale of 0 to 4, with the numbers indicating the difference of “intention to smoke” pre and post viewing the advertisements), with a maximum standard deviation of 1.5. To achieve a minimal power of 80% at a 5% significance level (two-sided), the study would require a sample of 73 participants. With a hypothetical wider standard deviation of 1.75, this would require a sample of 99 participants.

Statistical Analysis

Data were collected using MS excel 2007 (Microsoft Corporation, Seattle/WA, USA) and analysed using SPSS statistics 22 (IBM, New York/NY, USA). Normality was tested using the Shapiro–Wilks test. Categorical data were assessed using the $X^2$ test and non-categorical data were analysed using paired and unpaired $t$ tests, if normally distributed, and the Mann–Whitney test, if non-normally distributed. A $p$-value of $< 0.05$ was considered as being significant.

Results

One hundred and six participants (22 ± 2 years, 66% male) completed the study, comprising cigarette smokers (32%), non-smokers (54%) and ex-smokers (14%). This included vapers (16%), non-vapers (77%) and ex-vapers (7%) (Table 1). The vapers ($n = 17$) consisted of 59% non-smokers and 41% ex-smokers. The non-vapers ($n = 82$) comprised 51% non-smokers, 41% smokers and 7% ex-smokers. The smokers ($n = 34$) comprised 100% non-vapers. The non-smokers ($n = 57$) comprised 74% vapers, 18% non-vapers and 9% ex-vapers.

Perceptions of E-cigarettes Pre and Post Advertising

Overall, after viewing the e-cigarette advertising, participants felt that smoking conventional cigarettes was more socially acceptable ($Δ0.82 ± 0.29$ 95% CI, $p < 0.001$). Further, they felt that e-cigarettes were more efficient ($Δ0.14 ± 0.12$ 95% CI, $p = 0.020$) than alternative nicotine replacement therapies (NRT) at preventing smoking, compared to before viewing the adverts. Overall, after viewing the adverts the perceived safety of e-cigarettes compared to conventional cigarettes declined ($Δ-0.13 ± 0.10$ 95% CI, $p = 0.014$), although e-cigarettes were still viewed as safer than conventional cigarettes (Table 2).

Sub-group Analysis: Smokers and Non-smokers

After viewing the advertisements, cigarette smokers ($Δ1.18 ± 0.57$ 95% CI, $p < 0.001$) and non-smokers ($Δ0.44 ± 0.29$ 95% CI, $p = 0.007$) felt that conventional cigarette smoking was more socially acceptable. Non-smokers, but not smokers, rating of the relative safety of e-cigarettes in comparison to conventional cigarettes.

Table 1 Participant demographics; including sub-group comparison of non-smokers versus smokers, and non-vapers versus vapers

| Table 1 | All participants ($n = 106$) | Non-smokers ($n = 57$) | Smokers ($n = 34$) | $p$-Value | Non-vapers ($n = 82$) | Vapers ($n = 17$) | $p$-Value |
|---------|-----------------------------|------------------------|-------------------|-----------|------------------------|-----------------|-----------|
| Age (range) | 21.7 (1.8) | 22.0 (1.9) | 21.4 (1.9) | **0.129** | 21.5 (1.9) | 21.9 (1.6) | **0.379** |
| Male (n, %) | 66% | 32 (56%) | 25 (74%) | **0.097** | 54 (66%) | 11 (65%) | **0.928** |
| Female (n, %) | 44% | 25 (44%) | 9 (26%) | **0.935** | 28 (34%) | 6 (35%) | **0.056** |
| Asian/A-British | 50 (47%) | 29 (51%) | 17 (50%) | **0.112** | 37 (45%) | 12 (71%) | **0.649** |
| Black/B-British | 16 (15%) | 10 (18%) | 2 (6%) | **0.086** | 11 (13%) | 3 (18%) | **0.129** |
| Chinese/C-British | 10 (9%) | 8 (14%) | 1 (3%) | **0.409** | 6 (7%) | 1 (6%) | **0.834** |
| Mixed | 7 (7%) | 4 (7%) | 1 (3%) | **0.001** | 6 (7%) | 1 (6%) | **0.089** |
| White | 23 (22%) | 6 (11%) | 13 (38%) | **0.001** | 20 (24%) | 1 (6%) | **0.089** |

Perceptions of E-cigarettes are an effective means to help quit smoking. Efficient = e-cigarettes are more efficient that nicotine replacement therapy (e.g. patches) at quitting smoking. Safer = e-cigarettes are safer to use that conventional cigarettes. Harmful = e-cigarettes are harmful to health. Normalising = e-cigarettes are increasing the social acceptability of conventional cigarette smoking.
declined ($\Delta - 0.14 \pm 0.14$ 95% CI, $p = 0.044$). In the smoking and non-smoking groups, after viewing the adverts, there were no significant changes regarding the effectiveness of e-cigarettes in smoking cessation, the efficiency of e-cigarettes compared to NRT, or their potential harm to health (Table 3).

### Sub-group Analysis: Vapers and Non-Vapers

After viewing the advertisements, non-vapers (but not vapers) felt that conventional cigarette smoking was more socially acceptable ($\Delta 0.89 \pm 0.34$ 95% CI, $p < 0.001$). Non-vapers felt that e-cigarettes were more efficient than NRT ($\Delta 0.18 \pm 0.14$ 95% CI, $p = 0.013$) in preventing smoking. Non-vapers rating of the relative safety of e-cigarettes compared to conventional cigarettes also declined ($\Delta - 0.18 \pm 0.13$ 95% CI, $p = 0.006$). The adverts had no significant impact on the perception of e-cigarettes amongst our current vapers (Table 4).

### Impact of Advertisements on Intention to Smoke

Overall, participants were more likely to smoke a conventional cigarette ($\Delta 0.55 \pm 1.19$ 95% CI, $p < 0.001$) and an e-cigarette ($\Delta 1.20 \pm 0.26$ 95% CI, $p < 0.001$) after viewing the e-cigarette advertisements compared to before. Though sub-group analyses revealed that smokers, non-smokers and non-vapers to be more inclined to do so, vapers were actually less likely to smoke both a conventional, and an e-cigarette after viewing the advertising (Table 5). Participants overall had less intention to quit smoking after viewing the advertisements ($\Delta - 0.59 \pm 0.55$ 95% CI, $p = 0.041$), compared to before. Sub-group analyses revealed this to also be the case for vapers, non-vapers and smokers (Table 5).

### Knowledge of Smoking-Related Health Consequences

Non-smokers revealed an increased awareness of diseases/conditions related to smoking compared to smokers (for more detailed information please refer to the online Supplementary file Table E2). There was a statistically significant difference ($p < 0.001$) regarding the awareness of smoking-related menopause, rheumatoid arthritis, ageing, blindness (all $p < 0.001$), and also with respect to knowledge of COPD and fertility problems ($p < 0.05$). Current e-cigarette users were more aware of the condition/diseases related to smoking than the non-e-cigarette users (for more detailed

### Table 3 Perceptions of e-cigarettes pre and post advertising exposure: smokers and non-smokers

| Total ($n = 89$) | Smokers ($n = 33$) | Non-smokers ($n = 56$) |
|------------------|---------------------|------------------------|
|                  | Before               | After                  | $\Delta$ (95% CI) | $p$ | Before               | After                  | $\Delta$ (95% CI) | $p$ |
| Effective        | 4.21 (0.84)          | 4.18 (0.72)            | $-0.03$ (0.28)    | 0.830 | 3.74 (0.74)          | 3.67 (0.61)            | $-0.07$ (0.14)    | 0.322 |
| Efficient        | 3.94 (0.92)          | 4.09 (0.79)            | $0.15$ (0.21)     | 0.166 | 3.28 (0.77)          | 3.44 (0.68)            | $0.16$ (0.17)     | 0.072 |
| Safer            | 4.50 (0.75)          | 4.32 (0.68)            | $-0.18$ (0.22)    | 0.124 | 4.07 (0.70)          | 3.93 (0.49)            | $-0.14$ (0.14)    | 0.044 |
| Harmful          | 1.94 (0.85)          | 2.21 (1.07)            | $0.26$ (0.34)     | 0.150 | 2.28 (0.77)          | 2.33 (0.83)            | $0.05$ (0.18)     | 0.568 |
| Normalising      | 2.62 (1.04)          | 3.79 (1.07)            | $1.18$ (0.57)     | 0.001 | 3.23 (0.68)          | 3.67 (0.83)            | $0.44$ (0.29)     | 0.007 |

Effective = e-cigarettes are an effective means to help quit smoking. Efficient = e-cigarettes are more efficient that nicotine replacement therapy (e.g. patches) at quitting smoking. Safer = e-cigarettes are safer to use that conventional cigarettes. Harmful = e-cigarettes are harmful to health. Normalising = e-cigarettes are increasing the social acceptability of conventional cigarette smoking

### Table 4 Perceptions of e-cigarettes pre and post advertising exposure: vapers and non-vapers

| Vapers ($n = 16$) | Non-vapers ($n = 81$) |
|-------------------|----------------------|
|                   | Before               | After                  | $\Delta$ (95% ) | $p$ | Before               | After                  | $\Delta$ (95% ) | $p$ |
| Effective         | 3.88 (0.70)          | 3.82 (0.81)            | $-0.06$ (0.29)   | 0.655 | 4.00 (0.85)          | 3.95 (0.72)            | $-0.05$ (0.14)   | 0.495 |
| Efficient         | 3.71 (0.69)          | 3.71 (0.69)            | $0.00$ (0.26)    | 1.000 | 3.61 (0.98)          | 3.79 (0.86)            | $0.18$ (0.14)     | 0.013 |
| Safer             | 4.12 (0.60)          | 4.06 (0.66)            | $-0.06$ (0.12)   | 0.317 | 4.33 (0.75)          | 4.15 (0.63)            | $-0.18$ (0.13)    | 0.006 |
| Harmful           | 2.35 (1.00)          | 2.47 (1.07)            | $0.12$ (0.65)    | 0.942 | 2.05 (0.80)          | 2.23 (0.93)            | $0.18$ (0.18)     | 0.050 |
| Normalising       | 3.18 (0.81)          | 3.53 (1.07)            | $0.35$ (0.68)    | 0.323 | 2.88 (0.99)          | 3.77 (0.93)            | $0.89$ (0.34)     | <0.001 |

Effective = e-cigarettes are an effective means to help quit smoking. Efficient = e-cigarettes are more efficient that nicotine replacement therapy (e.g. patches) at quitting smoking. Safer = e-cigarettes are safer to use that conventional cigarettes. Harmful = e-cigarettes are harmful to health. Normalising = e-cigarettes are increasing the social acceptability of conventional cigarette smoking
Intention to vape as smoke-like vapours and glowing tips during inhalation other characteristic features of conventional cigarettes such as smoke-like vapours and glowing tips during inhalation reinforce the use of the original unhealthy product [32].

The industry has an established interest in attracting young people to conventional smoking in a sublime way to new generations. The change in attitude favouring an unhealthy behaviour after viewing an advertisement is not unexpected [38], and although the correlation between intended and actual behaviour is known to be weak [39], cigarette advertising in the past has had a harmful impact on society [40]. Interestingly, all participants felt that the adverts were normalising the social acceptability of smoking. This highlights the subconscious impact that advertising has on an individual [41].

**Discussion**

E-cigarette advertising increases the social acceptability, and intention to smoke conventional cigarettes in a young student population.

Since the 1970s, tobacco companies have not been able to advertise their products on British television or radio [30]. It is therefore important to understand that e-cigarette advertising potentially markets not only ‘vaping’ but also conventional smoking in a sublime way to new generations.

Despite the advertising standards set out by CAP, e-cigarette adverts are designed to be attractive to all potential users, smokers and non-smokers, of any age. The tobacco industry has an established interest in attracting young people to the market [31]. Media reports suggest that companies producing e-cigarettes are employing similar marketing tactics that were previously used to attract younger people to smoking, by presenting the use of e-cigarettes as a desirable pursuit [27].

While e-cigarettes are marketed as a healthy substitute to conventional smoking, healthy substitutes are known to reinforce the use of the original unhealthy product [32]. E-cigarettes are designed to emulate conventional cigarettes in the way they look and feel and by the inclusion of other characteristic features of conventional cigarettes such as smoke-like vapours and glowing tips during inhalation.
well versed around e-cigarettes, or whom had already had formulated views, may have been more likely to take part, skewing our results. With this in mind, the introduction to the study was kept neutral in order to obtain data from participants independent of the view of electronic cigarettes.

Several e-cigarette adverts were shown to participants within a short time period and this could have caused a greater emotional response than showing single advertisement images over a longer time. This might further lead to a negative response when viewing them. Future study designs should aim to study the longitudinal effect of exposure to adverts to allow for a similar effect as in real life.

Our survey was designed by internal peer review through four academic institutions and based on three previously published studies [42–44]. Our primary outcome of intention smoke a conventional cigarette was assessed with a likert scale ranging from 1 to 5. We included this single question to reduce the survey burden on the participant and ensure accurate completion, though this method to determine intention to smoke has not been assessed for validity or reliability. We had a 100% survey completion rate suggesting that survey fatigue was not an issue. Future studies should include validated and reliable measures for intention to smoke such as the three-item scale by Pearson et al. [45].

Further, studies could also utilise conditional risk assessments, where participants are asked to consider potential outcomes if they, hypothetically, were to engage in that particular behaviour (e.g. “what is the chance you would become unwell if you were to smoke a conventional cigarette”). Such measures have shown to be a superior indicator of behaviour [46], and also have the added benefits of revealing the underlying beliefs which may drive that behaviour.

Lastly, while we have classified participants into smokers, non-smokers and ex-smokers; however, no distinction was made between different smokers in terms of the number of cigarettes per day, or the duration they had been smoking. These are important factors to be determined in future studies, as it is known that university students, who are young and may have a shorter smoking history, may predominantly be light or intermittent smokers [47]. Light and intermittent smokers are believed to be less susceptible to tobacco prevention messages, as they do not consider themselves being typical smokers [48, 49], although these cohorts are at risk of developing long-term smoking habits with reduced concerns about smoking-related consequences [50, 51]. It is therefore important to understand how e-cigarette advertising may impact the propensity to develop consolidated or worsening smoking habits in various groups of smokers.

Conclusion

Electronic cigarette advertisement has a negative impact on the smoking perception amongst students. The advertisements influence young people, irrespective of their previous smoking habits, towards smoking e-cigarettes and conventional cigarettes. It also impacts on their acceptance of smoking behaviour and fails to encourage smoking cessation. With the advent of e-cigarettes advertisement, public health faces a new marketing campaign that promotes tobacco industry products that mimic smoking. As the popularity of e-cigarettes continues to thrive, not enough is being done to explore their safety and efficacy or the marketing tactics being used to sell them.

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Authors Contributions CR designed the study, items, guided data collection, analysed data, wrote and submitted the manuscript; he is the papers first guarantor. JS guided analysis, discussion and critically revised the paper. KR revised and critically reviewed the paper. TK helped form the research, guided data collection, analysis and discussion, and critically revised the paper prior to submission; he is the second guarantor.

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Compliance with Ethical Standards

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References

1. Beard E, Brown J, McNeill A, Michie S, West R (2015) Has growth in electronic cigarette use by smokers been responsible for the decline in use of licensed nicotine products? Findings from repeated cross-sectional surveys. Thorax 70(10):974–978
2. Rom O, Pecorelli A, Valacchi G, Reznick AZ (2015) Are e-cigarettes a safe and good alternative to cigarette smoking? Ann N Y Acad Sci 1340:65–74
3. Use of electronic cigarettes (vapourisers) among adults in Great Britain—September 2018. http://ash.org.uk/wp-content/uploads/
4. Schraufnagel DE, Blasi F, Drummond MB, Lam DC, Latif E, Rosen MJ et al (2014) Electronic cigarettes. A position statement of the forum of international respiratory societies. Am J Respir Crit Care Med 190(6):611–618

5. Harrell PT, Simmons VN, Correa JB, Padhya TA, Brandon TH (2014) Electronic nicotine delivery systems (“e-cigarettes”): review of safety and smoking cessation efficacy. Otalaryngol Head Neck Surg 151(3):381–393

6. COUNCIL D 2014/40/EU OTEPAOT. (2014) The tobacco products directive (2014/40/EU).

7. Medicines and Healthcare products Regulatory Agency—GOV.UK. (2016) http://www.gov.uk/government/organisations/medicines-and-healthcare-products-regulatory-agency. Accessed 11 Feb 2016

8. Electronic cigarettes - Committee of Advertising Practice. http://www.cap.org.uk/Advice-Training-on-the-rules/Advice-Online-Database/Electronic-cigarettes.aspx. Vr2QFMDmQr. Accessed 12 Feb 2016

9. E-cigarettes around 95% less harmful than tobacco estimates landmark review—Press releases—GOV.UK. http://www.gov.uk.gov.uk/government/news/e-cigarettes-around-95-less-harmful-than-tobacco-estimates-landmark-review. Accessed 12 Feb 2016

10. McKee M, Capewell S (2015) Evidence about electronic cigarettes: a foundation built on rock or sand? BMJ 351:h4863

11. Lancet The (2015) E-cigarettes: Public Health England’s evidence-based confusion. Lancet 386(9996):829. https://doi.org/10.1016/S0140-6736(15)00402-2.

12. Bachman JG, Wadsworth KN, O’Malley PM, Johnston LD, Schulenberg JE (2013) Drinking, and drug use in young adulthood: The impacts of new freedoms and new responsibilities. Psychology Press, Hoboken

13. Freedman KS, Nelson NM, Feldman LL (2012) Smoking initiation among young adults in the United States and Canada, 1998–2010: a systematic review. Prev Chronic Dis. 9:E05

14. Mikkelsen TF, Graff-Iversen S, Sundby J, Bjertness E (2007) Delayed conception and active and passive smoking. Fertil Steril 74(4):725–733

15. Valdes AM, Andrew T, Gardner JP, Kimura M, Oelsner E, Cherkas LF et al (2005) Obesity, cigarette smoking, and telomere length in women. Lancet 366(9486):662–664

16. Tickle JJ, Hull JG, Sargent JD, Dalton MA, Heatherton TF (2006) A structural equation model of social influences and exposure to media smoking on adolescent smoking. Basic Appl Psychol 28(2):117–129

17. De Andrade M, Hastings G, Angus K, Dixon D, Purves R. The marketing of electronic cigarettes in the UK. Mark Retail Res. Reports. 2013. https://dspace.stir.ac.uk/handle/1893/17889. Accessed Nov 2013.

18. Richardson A, Ganz O, Stalgaitsis C, Abrams D, Vallone D (2013) Noncombustible tobacco product advertising: how companies are selling the new face of tobacco. Nicotine Tob Res 16(5):606–614

19. Richardson A, Ganz O, Vallone D (2015) Tobacco surveillance and characterisation of online tobacco and e-cigarette advertising. Tob Control 24(4):341–347

20. Kelly SP (2005) Smoking and age-related macular degeneration: a population-based study. Am J Epidemiol 161(4):346–351

21. Ueshima H, Choudhury SR, Okayama A, Hayakawa T, Kita Y, Kadowaki T et al (2004) Cigarette smoking as a risk factor for stroke death in Japan. Stroke 35(8):1836–1841

22. Stampfer MJ, Hu FB, Manson JE, Rimm EB, Willett WC (2000) Primary prevention of coronary heart disease in women through diet and lifestyle. N Engl J Med 343(1):16–22

23. Brown AK, Moodie C, Hastings G, Mackintosh A-M, Hassan L, Thrasher J (2010) The association of normative perceptions with adolescent smoking intentions. J Adolesc 33(5):603–614

24. Burton D, Sussman S, Hansen WB, Johnson CA, Flay BR (1989) Image attributions and smoking intentions among seventh grade students. J Appl Soc Psychol 19(8):656–664

25. Burton D, Sussman S, Hansen WB, Johnson CA, Flay BR (1989) Image attributions and smoking intentions among seventh grade students. J Appl Soc Psychol 19(8):656–664

26. Ueshima H, Choudhury SR, Okayama A, Hayakawa T, Kita Y, Kadowaki T et al (2004) Cigarette smoking as a risk factor for stroke death in Japan. Stroke 35(8):1836–1841

27. Stampfer MJ, Hu FB, Manson JE, Rimm EB, Willett WC (2000) Primary prevention of coronary heart disease in women through diet and lifestyle. N Engl J Med 343(1):16–22

28. Brown AK, Moodie C, Hastings G, Mackintosh A-M, Hassan L, Thrasher J (2010) The association of normative perceptions with adolescent smoking intentions. J Adolesc 33(5):603–614

29. Burton D, Sussman S, Hansen WB, Johnson CA, Flay BR (1989) Image attributions and smoking intentions among seventh grade students. J Appl Soc Psychol 19(8):656–664

30. Burton D, Sussman S, Hansen WB, Johnson CA, Flay BR (1989) Image attributions and smoking intentions among seventh grade students. J Appl Soc Psychol 19(8):656–664

31. Lovato C, Linn G, Stead LF, Best A (2003) Impact of tobacco advertising and promotion on increasing adolescent smoking behaviours. The Cochrane Library. 2003:CD003439

32. Wilcox K, Vallen B, Block L, Fitzsimons GJ (2009) Vicarious goal fulfillment: when the mere presence of a healthy option leads to an ironically indulgent decision. J Consum Res 36(3):380–393

33. Pepper JK, Brewer NT (2014) Electronic nicotine delivery system (electronic cigarette) awareness, use, reactions and beliefs: a systematic review. Tob Control 23(5):375–384

34. Cook R, Davidson P, Martin R (2019) E-cigarettes helped more smokers quit than nicotine replacement therapy. Br Med J. 365:l2036

35. Hajek P, Phillips-Waller A, Pruzulj D, Pesola F, Myers Smith K, Bisal N et al (2019) A randomized trial of e-cigarettes versus nicotine-replacement therapy. N Engl J Med 380(7):629–637

36. British American Tobacco - E-cigarettes. http://www.bat.com/consumerfacts/ecigarettes. Accessed 7 Mar 2016

37. Bullen C, Howe C, Laugesen M, McRobbie H, Parag V, Williamson J et al (2013) Electronic cigarettes for smoking cessation: a randomized controlled trial. The Lancet 382(9905):1629–1637

38. Kelly SP (2005) Smoking and age-related macular degeneration: a population-based study. Ann Rheum Dis 62(9):835–841

39. Madden TJ, Ellen PS, Ajzen I (1992) A comparison of the theory of planned behavior and the theory of reasoned action. Pers Soc Psychol Bull 18(1):3–9

40. Blecher E (2008) The impact of tobacco advertising bans on consumption in developing countries. J Health Econ 27(4):930–942

41. Heath R (2012) Seducing the subconscious: the psychology of emotional influence in advertising. Wiley, Chichester

42. Ratneswaran C, Chisnall B, Drakatos P, Sivakumar S, Sivakumar B, Barrecheguren M et al (2014) A cross-sectional survey investigating the desensitisation of graphic health warning labels and their impact on smokers, non-smokers and patients with COPD in a London cohort. BMJ Open 4(7):e004782

43. Ratneswaran C, Chisnall B, Li M, Tan S, Douiri A, Anantham D et al (2016) Desensitisation to cigarette package graphic health...
warnings: a cohort comparison between London and Singapore. BMJ Open 6(10):e012693
44. Ng DHL, Roxburgh STD, Sanjay S, Eong KGA (2010) Awareness of smoking risks and attitudes towards graphic health warning labels on cigarette packs: a cross-cultural study of two populations in Singapore and Scotland. Eye 24(5):864–868
45. Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Berry CC (1998) Tobacco industry promotion of cigarettes and adolescent smoking. JAMA 279(7):511–515
46. Chaffee BW, Gansky SA, Halpern-Felsher B, Couch ET, Essex G, Walsh MM (2015) Conditional risk assessment of adolescents’ electronic cigarette perceptions. Am J Health Behav 39(3):421–432
47. Halperin AC, Smith SS, Heiligenstein E, Brown D, Fleming MF (2009) Cigarette smoking and associated health risks among students at five universities. Nicotine Tob Res 12(2):96–104
48. Berg CJ, Lust KA, Sanem JR, Kirch MA, Rudie M, Ehlinger E et al (2009) Smoker self-identification versus recent smoking among college students. Am J Prev Med 36(4):333–336
49. Levinson AH, Campo S, Gascoigne J, Jolly O, Zakharyan A, Vu Tran Z (2007) Smoking, but not smokers: identity among college students who smoke cigarettes. Nicotine Tob Res 9(8):845–852
50. Murphy-Hoefer R, Alder S, Higbee C (2004) Perceptions about cigarette smoking and risks among college students. Nicotine Tob Res 6(Suppl 3):S371–S374
51. Morley KI, Hall WD, Hausdorf K, Owen N (2006) ‘Occasional’ and ‘social’ smokers: potential target groups for smoking cessation campaigns? Aust N Z J Public Health 30(6):550–554

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