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Reported exposure to E-cigarette advertising and promotion in different regulatory environments: Findings from the International Tobacco Control Four Country (ITC-4C) Survey

E. Wadsworth[a,b,*], A. McNeill[a,b], L. Li[c], D. Hammond[d], J.F. Thrasher[e], H.-H. Yong[c], K.M. Cummings[f], G.T. Fong[d,g,h], S.C. Hitchman[a,b]

[a] National Addiction Centre, King's College London, London, UK
[b] UK Centre for Tobacco and Alcohol Studies, UK
[c] Cancer Council Victoria, Melbourne, Victoria, Australia
[d] School of Public Health and Health Systems, University of Waterloo, Waterloo, Ontario, Canada
[e] Arnold School of Public Health, University of South Carolina, SC, USA
[f] Department of Psychiatry and Behavioural Sciences, Medical University of South Carolina, Charleston, SC, USA
[g] Department of Psychology, University of Waterloo, Waterloo, Ontario, Canada
[h] Ontario Institute for Cancer Research, Toronto, Ontario, Canada

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ABSTRACT

Electronic cigarette (e-cigarette) advertising regulations differ across countries. This study examines how differences in e-cigarette advertising regulations influence exposure to e-cigarette advertising, and perceptions about what participants had seen and read about e-cigarettes. Data come from the ITC Four Country Survey (Canada [CA], United States [US], Australia [AU] and United Kingdom [UK]) carried out between August 2013 and March 2015 ($n = 3460$). In 2014, AU and CA had laws prohibiting the retail sale of e-cigarettes containing nicotine while the US and UK had no restrictions, although a voluntary agreement restricting advertising in the UK was introduced during fieldwork. Smokers and ex-smokers were asked whether in the last six months they had noticed e-cigarettes advertisements and received free samples/special offers (promotion), and about their perceptions (positive or otherwise) of what they had seen or read about e-cigarettes. Data were analyzed in 2017. US and UK participants were more likely to report that they had noticed e-cigarette advertisements and received promotions compared to CA or AU participants. For TV and radio advertisements, reported exposure was higher in US compared to UK. For all types of advertisements, reported exposure was higher in CA than AU. Overall, nearly half of AU (44.0%) and UK (47.8%) participants perceived everything they had seen and read about e-cigarettes to be positive, with no significant differences between AU and UK. Participants in countries with permissive e-cigarette advertising restrictions and less restrictive e-cigarette regulations were more likely to notice advertisements than participants in countries with more restrictive e-cigarette regulations.

1. Introduction

Electronic cigarettes (e-cigarettes) are electronic devices that can create an aerosol to deliver nicotine. A recent review suggests that e-cigarettes provide lower exposure to toxins and chemicals, and are therefore less harmful than smoking cigarettes (Glasser et al., 2017). Since their introduction to the market in 2004, awareness and use of e-cigarettes has grown rapidly (Yong et al., 2015; Pepper and Brewer, 2013; Office for National Statistics, 2017). In 2015, the global market for e-cigarette sales was estimated at around 10 billion US dollars (World Health Organization, 2016). In the UK, the percentage of smokers who reported regularly vaping increased over 5-fold from 2010 to 2015 (i.e. from 2.7% to 14.4%) (Office for National Statistics, 2017). Similar increases in the reported use of e-cigarettes by adult current and ex-smokers have been reported in CA, US, and AU (Pepper and Brewer, 2013).

Advertisements and the internet are common channels through which many users become aware of and learn about e-cigarettes (Glasser et al., 2017; Pepper et al., 2014; Wackowski et al., 2015). Research shows that cigarette advertising has a causal relationship with cigarette consumption (National Cancer Institute, 2008; World Health Organization, 2013), so one might expect to find the same relationship

* Corresponding author at: School of Public Health and Health Systems, University of Waterloo, 200 University Avenue West, Waterloo N2L 3G1, Canada.
E-mail address: ewadsworth@uwaterloo.ca (E. Wadsworth).

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Table 1
Unweighted sample characteristics by country (Aug 2013–Mar 2015), n = 7746.

	Respondents in all four countries (n = 7746)				Respondents included in the analyzes (n = 3460)			
	Canada % (n = 1592)	US % (n = 3208)	UK % (n = 1470)	Australia % (n = 1476)	Canada % (n = 475)	US % (n = 1799)	UK % (n = 734)	Australia % (n = 452)
Sex								
Female	53.0	51.7	52.6	53.7	53.5	54.3	54.0	56.9
Male	47.0	48.3	47.4	46.3	46.5	45.7	46.0	43.1
Age								
18–24	1.2	5.2	2.4	2.8	1.9	7.1	3.5	5.1
25–39	12.8	20.0	19.0	15.7	21.3	24.1	22.1	19.0
40–54	34.7	26.6	32.2	36.9	35.8	27.6	35.3	38.3
55+	51.3	48.2	46.5	44.6	41.1	41.2	39.1	37.6
Ethnicity								
White	92.5	77.6	92.7	91.7	92.2	78.2	93.2	92.9
Non-white	7.5	22.4	6.7	7.7	7.8	21.8	6.8	7.1
Education								
Low	38.3	39.8	47.1	46.3	34.9	38.1	43.6	42.0
Medium	39.5	39.2	27.9	31.9	44.2	42.1	28.9	37.2
High	21.6	21.0	23.7	21.1	20.8	19.8	27.5	20.8
Income								
Low	22.4	37.3	30.3	26.4	17.5	36.6	25.3	25.7
Medium	34.2	29.2	29.8	26.4	36.8	28.9	30.9	27.0
High	34.2	31.3	31.6	38.1	36.8	32.6	36.1	38.5
No answer	9.2	2.2	8.3	9.1	8.8	1.8	7.6	8.8
E-cigarette status								
Not at all	21.7	29.8	9.4	19.8	72.8	53.0	46.2	63.5
Daily	1.8	6.8	6.0	2.4	6.1	12.2	18.3	7.7
Weekly	1.9	6.5	12.1	1.5	6.5	11.7	11.6	4.6
Monthly	4.3	13.0	23.3	7.4	14.5	23.1	24.0	24.1
Smoking status								
Quitter	24.1	18.6	23.1	26.2	12.0	14.6	16.1	11.7
Daily	70.9	68.5	70.7	68.1	81.9	72.2	77.1	80.5
Non-daily	5.1	12.8	6.2	5.8	6.1	13.2	6.8	7.7
Survey mode								
Telephone	42.1	19.5	35.6	25.8	39.2	14.6	32.7	25.9
Internet	57.9	80.5	64.4	74.2	60.8	85.4	67.3	74.1

with e-cigarette advertising. Indeed, studies have found associations between exposure to e-cigarette advertising, and intention to use or use of e-cigarettes (Agaku et al., 2017; Collins et al., 2018). E-cigarette use is higher in countries with less restrictive e-cigarette regulations (Yong et al., 2015; De Andrade et al., 2013a; Federal Trade Commission, 2013; Gravely et al., 2014). This could be beneficial if adult smokers who would otherwise not quit switch to e-cigarettes, whereas the opposite would be the case if e-cigarette advertisements increased dual use and use by non-smokers (National Cancer Institute, 2008; De Andrade et al., 2013a; De Andrade et al., 2013b; Fairchild et al., 2014; Kim et al., 2014; Maloney and Cappella, 2016).

Previous studies have explored the effect of advertising regulations on noticing e-cigarette advertising in the Netherlands (Nagelhout et al., 2016) and examined exposure to advertising in the European Union member states (Filippidis et al., 2017). No study to date has looked at a cross-country comparison where the countries have varying e-cigarette advertising regulations but similar restrictive tobacco advertising regulations. In this paper, we present the results from the International Tobacco Control Four Country (ITC-4C) Survey. We compare exposure to e-cigarette advertising in two countries, which at the time of the survey had restrictive (CA and AU) policies on advertising e-cigarettes and two countries with permissive (US and UK) policies. In addition, we compare perceptions of what participants had seen and read about e-cigarettes in AU and UK. At the time, both CA and AU had laws prohibiting the retail sale and advertisement of e-cigarettes containing nicotine in all channels asked in this study, whereas there were no such regulations in the US and UK (BBC News, 2014; Global Tobacco Control, n.d.; Government of Canada, n.d.; Hammond et al., 2015; McNeill et al., 2015; Office of the Federal Register, 2016). However, in the UK a voluntary agreement restricting e-cigarette advertising content was introduced during fieldwork, which restricted advertisements that promoted any image associated with tobacco, or that would undermine cessation messages (BBC News, 2014; McNeill et al., 2015).

In this paper we propose three hypotheses: (i) that advertising exposure will be higher in the US and UK and lower in CA and AU; (ii) that there will be further differences between individual countries due to other regulations, geographical locations, and presence of different e-cigarette companies; and (iii) that participants from less restrictive countries will be more likely to hold a positive opinion about e-cigarette messaging than those from more restrictive countries. All four countries adopted different advertising and regulatory approaches to e-cigarettes, which allows examination of differences in consumer exposure to advertising across countries with similar tobacco advertising regulations. This type of evidence will be important to inform advertising regulations as countries develop their frameworks.

2. Methods

2.1. Study design

The ITC-4C Survey has been conducted regularly in CA, US, AU, and the UK since 2002. It is a prospective cohort study with approximately 2000 participants per country per 'wave' with replenishment to compensate attrition. Further details including study design and recruitment can be found elsewhere (Fong et al., 2006; ITC Project, 2004; ITC Project, 2011a; ITC Project, 2011b; Thompson et al., 2006).

Recruitment of participants involved random digit dialing using probability sampling methods. Inclusion criteria included adults (over 18) who had smoked at least 100 cigarettes in their lifetime with a minimum of one cigarette smoked in the last 30 days. The same inclusion criteria were used in all replenishments. Participants completed the surveys via the internet or telephone. Participants were

compensated with a fixed monetary cheque or voucher before and/or after completing the survey. Country leads of the survey had control over which questions were to be included in each 'wave', therefore some survey questions varied across the four countries.

2.2. Sample

Of the original sample ($n = 7746$), 1592 from CA and 3208 from the US were surveyed from late 2013 to early 2015 while 1476 from AU and 1470 from the UK were surveyed in 2014. The final sample for this study excluded those who had not heard of e-cigarettes. The final sample consisted of 3460 smokers and ex-smokers (quitters) who were aware of e-cigarettes. In this study, ex-smokers were categorised as participants who were smokers in their first wave but had quit smoking in subsequent waves.

2.3. Measures

2.3.1. Covariates

Sample characteristics are shown for the whole sample ($n = 7746$) and the analytical sample for the study ($n = 3460$) (Table 1). Sample characteristics included country, sex (female, male), age at time of survey (18–24 years, 25–39, 40–54 and 55 and over), ethnicity (white vs non-white or English vs non-English spoken in the home (AU only)), education (low, medium and high), income (low, medium, high and no answer), smoking status (daily smoker, non-daily smoker and quitter), e-cigarette status (daily user, weekly user, monthly user and not at all) and survey mode (telephone vs the internet). Further explanation of education and income categories can be found elsewhere (ITC Project, 2011b; Thompson et al., 2006).

2.3.2. Noticing e-cigarette advertisements

Participants were asked: "In the last 6 months, have you noticed e-cigarettes being advertised in the following places: On television? On the Radio? On posters or billboards? In newspapers or magazines? On the Internet? In store windows? At point of sale in shops that sell e-cigarettes?" Answers were Yes/No/don't know/refused. "Don't Know" and "Refused" were categorised as "No". Noticing advertisements in store windows was asked in CA and US only. Noticing advertisements at point of sale in shops that sell e-cigarettes was asked in AU and UK only.

2.3.3. Receiving free samples or special discount for e-cigarettes

Participants were asked: "In the last 6 months, have you received any free samples of e-cigarette products" and "In the last 6 months, have you received any special discounts for e-cigarette products". "Don't Know" and "Refused" were categorised as "No". Receiving special discounts for e-cigarette products was asked in AU and UK only.

2.3.4. Perception of all they had seen or read about e-cigarettes

Participants were asked: "Thinking about all you have seen or read about e-cigarettes, would you say it is: Mostly positive? Slightly positive? Equally balanced? Slightly negative? Mostly negative?" The answers were categorised into one dichotomous variable: positive (mostly positive/slightly positive) vs otherwise (equally balanced/negative/don't know). Only participants from AU and UK were asked this question.

2.4. Statistical analysis

Data from all four countries were combined into one dataset. All analyzes used complex samples in SPSS 24 and were weighted unless otherwise stated. Nationally representative surveys from all four countries were used to generate weights for smokers and ex-smokers.[1] Data were analyzed in 2017.

First, sample characteristics were examined and Chi-squared tests were used to assess country differences. Logistic regression was first used to examine any country differences in e-cigarette advertisements and promotion. Second, logistic regression was used to examine any country differences in participant's perceptions of what they had seen and read about e-cigarettes, either positive or otherwise. The second logistic regression examining perceptions was then repeated adjusting for noticing e-cigarette advertisements on television, radio, posters and billboards, newspapers and magazines, the internet and at point of sale in shops that sold e-cigarettes. All multivariate analyzes were adjusted for sample characteristics, smoking status, e-cigarette status and the number of waves the participant had previously taken part in.

2.5. Ethics

For all countries, the ITC-4C Surveys were cleared for ethics by the Office of Research Ethics of the University of Waterloo in CA. Ethics clearance in AU was by the Cancer Council Victoria and by King's College London in the UK.

3. Results

Table 1 presents the sample characteristics, e-cigarette status and smoking status of the participants in all four countries included in the analysis.

3.1. Noticing e-cigarette advertisements

Table 2 shows that US participants were significantly more likely to have noticed e-cigarette advertising on television, radio and on the internet in the last six months than CA, AU and UK. US participants were significantly more likely to notice e-cigarette advertising on posters, billboards, newspapers and magazines than participants in CA and AU. There were no significant differences between participants in the US and UK in noticing e-cigarette advertisements on posters and billboards or newspapers and magazines. US participants were significantly more likely to have noticed e-cigarette advertisements in store windows than participants in CA (Supplementary Table 1). UK participants were more likely to have noticed advertisements at point of sale in shops that sell e-cigarettes than those in AU (Table S1).

Males, younger participants, and participants with a high education were all significantly more likely to have noticed e-cigarette advertisements on the internet. Males were all significantly more likely to have noticed e-cigarette advertisements on the television and posters and billboards than female participants. Younger participants were significantly more likely to have noticed advertisements on the radio and on posters and billboards and participants aged 40–54 were significantly more likely to have noticed advertisements in store windows and at the point of sale than participants over 55. White or English-speaking participants were significantly less likely than non-white or non-English speaking participants to have noticed advertisements on television, posters and billboards and newspapers and magazines. However, white or English speaking participants were significantly more likely to have noticed advertisements at point of sale (AU and UK) and in store windows (CA and US). Participants with medium or high education were significantly more likely to have noticed advertisements in newspapers and magazines than participants with low education. Participants with medium and high income were significantly less likely to have noticed advertisements on television compared to those with

[1] The 2012 Canadian Community Health Survey (CCHS) was used for Canada. The 2013 National Health Interview Survey (NHIS) was used for the United States. The 2013 National Drug Strategy Household Survey (NDSHS) in combination with census projections for June 2014 were used for Australia, and the 2013 General Lifestyle Survey was used for the United Kingdom.

Table 2
Self-reported exposure to e-cigarette advertisements in the last 6 months (Aug 2013–Mar 2015), by country and demographics, $n = 3460$.

	(*n*)[a]	In the last six months, have you noticed e-cigarettes being advertised in any of the following places?									
		Television		Radio		Posters & billboards		Newspapers & magazines		Internet	
		% exposed[b]	AOR (95% CI)	% exposed[b]	AOR (95% CI)	% exposed[b]	AOR (95% CI)	% exposed[b]	AOR (95% CI)	% exposed[b]	AOR (95% CI)
Country											
US	1799	58.8		23.7		36.1		42.5		45.5	
Canada	475	19.0	0.17 (0.12–0.24)	6.1	0.18 (0.10–0.30)	13.6	0.27 (0.18–0.40)	18.4	0.28 (0.19–0.39)	28.3	0.61 (0.44–0.83)
UK	734	39.8	0.53 (0.39–0.71)	11.9	0.34 (0.23–0.50)	34.7	1.04 (0.76–1.40)	41.2	0.96 (0.73–1.27)	32.7	0.58 (0.44–0.76)
Australia	452	6.0	0.05 (0.03–0.08)	2.5	0.06 (0.03–0.14)	3.3	0.07 (0.04–0.15)	5.3	0.09 (0.05–0.16)	19.2	0.34 (0.24–0.48)
Sex											
Female	1883	41.4	0.81 (0.67–0.99)	14.7	0.83 (0.64–1.07)	26.2	0.80 (0.65–0.99)	32.7	0.86 (0.71–1.05)	33.9	0.79 (0.66–0.96)
Male	1577	43.0		17.0		30.2		35.1		39.5	
Age											
18–24	186	56.0	1.40 (0.90–2.18)	27.1	2.92 (1.75–4.88)	37.3	1.75 (1.12–2.72)	40.9	1.33 (0.87–2.05)	51.9	2.17 (1.45–3.26)
25–39	783	38.3	0.80 (0.61–1.03)	18.3	2.12 (1.50–2.99)	31.6	1.45 (1.11–1.90)	33.9	1.01 (0.78–1.32)	42.1	1.61 (1.25–2.06)
40–54	1098	42.0	1.04 (0.84–1.30)	14.9	1.59 (1.16–2.19)	26.3	1.22 (0.96–1.55)	33.3	1.06 (0.85–1.33)	33.8	1.24 (1.00–1.55)
55 +	1393	42.8		10.5		23.6		32.5		29.2	
Ethnicity											
White	2948	40.2	0.74 (0.55–0.99)	15.0	0.82 (0.59–1.14)	25.8	0.54 (0.41–0.72)	32.1	0.69 (0.53–0.90)	36.5	1.19 (0.92–1.55)
Non-white	512	54.3		21.5		43.2		45.2		39.4	
Education											
Low	1361	44.6		17.4		26.6		31.4		34.2	
Medium	1347	42.2	1.07 (0.85–1.33)	14.5	0.87 (0.64–1.17)	28.3	1.26 (0.99–1.59)	34.3	1.29 (1.03–1.61)	37.0	1.18 (0.95–1.47)
High	752	38.1	0.95 (0.71–1.25)	15.9	0.96 (0.67–1.37)	31.2	1.31 (0.97–1.76)	37.7	1.33 (1.01–1.76)	41.3	1.39 (1.07–1.81)
Income											
Low	1044	53.2		17.7		30.6		36.1		37.1	
Medium	1044	39.7	0.71 (0.55–0.92)	15.1	1.08 (0.78–1.50)	28.3	1.05 (0.80–1.37)	32.9	0.96 (0.75–1.23)	35.3	1.04 (0.81–1.33)
High	1201	36.6	0.67 (0.52–0.87)	16.0	1.18 (0.85–1.65)	27.6	1.03 (0.79–1.35)	33.9	1.04 (0.81–1.34)	38.3	1.10 (0.86–1.40)
No answer	171	33.1	0.84 (0.51–1.37)	10.4	0.90 (0.36–2.26)	18.8	0.82 (0.45–1.51)	27.3	1.00 (0.60–1.65)	34.2	1.31 (0.81–2.12)
Smoking status											
Quitter	491	40.2		12.9		27.0		35.7		37.4	
Daily	2618	41.9	1.04 (0.77–1.42)	15.8	1.55 (1.04–2.29)	27.6	1.06 (0.77–1.46)	32.1	0.89 (0.66–1.19)	35.5	0.99 (0.74–1.33)
Non-daily	351	47.4	1.10 (0.71–1.69)	21.3	1.65 (0.97–2.80)	35.1	1.19 (0.77–1.84)	44.8	1.32 (0.88–1.96)	45.9	1.14 (0.78–1.65)
E-cigarette status											
Not at all	1926	40.5		13.9		26.9		33.3		30.5	
Daily	417	43.6	0.92 (0.68–1.24)	20.3	1.46 (0.99–2.15)	30.8	1.01 (0.74–1.38)	34.8	0.83 (0.61–1.13)	50.5	2.21 (1.64–2.98)
Weekly	347	48.1	1.03 (0.73–1.45)	19.6	1.13 (0.75–1.71)	35.2	1.17 (0.81–1.68)	36.3	0.89 (0.63–1.27)	47.1	1.74 (1.26–2.41)
Monthly	770	43.1	0.97 (0.76–1.25)	17.0	1.08 (0.78–1.50)	27.2	0.86 (0.67–1.11)	33.9	0.95 (0.74–1.21)	41.1	1.51 (1.20–1.90)
Survey mode											
Telephone	805	41.7	1.50 (1.18–1.91)	16.8	1.75 (1.28–2.38)	32.0	1.99 (1.53–2.60)	36.7	1.68 (1.31–2.16)	31.8	1.02 (0.80–1.30)
Internet	2655	42.4		15.7		27.2		33.1		38.4	

AOR = adjusted odds ratio, CI = confidence interval.
[a] Unweighted data.
[b] Weighted data.

Table 3
Self-reported exposure to free samples (n = 3460) and special offers (n = 1186) in the last 6 months (Aug 2013–Mar 2015), by country and demographics.

	In the last six months, have you received any of the following E-cigarette products?					
	Free samples			Special offers		
	(n)[a]	% exposed[b]	AOR (95% CI)	(n)[a]	% exposed[b]	AOR (95% CI)
Country						
US	1799	13.3		N/A	N/A	N/A
Canada	475	2.3	0.33 (0.15–0.70)	N/A	N/A	N/A
UK	734	6.0	0.76 (0.48–1.23)	734	12.5	3.50 (1.68–7.31)
Australia	452	2.5	0.25 (0.11–0.54)	452	3.8	
Sex						
Female	1883	9.1	1.13 (0.82–1.55)	653	6.8	0.58 (0.34–0.98)
Male	1577	8.5		533	11.2	
Age						
18–24	186	8.8	1.40 (0.69–2.86)	49	9.9	1.31 (0.38–4.53)
25–39	783	12.9	3.20 (2.08–4.93)	248	11.3	1.23 (0.66–2.36)
40–54	1098	8.3	2.05 (1.32–3.20)	432	7.6	0.78 (0.41–1.47)
55+	1393	4.1		457	8.5	
Ethnicity						
White	2948	8.3	1.07 (0.73–1.57)	1104	9.0	0.76 (0.30–1.91)
Non-white	512	11.3		82	11.0	
Education						
Low	1361	10.1		510	8.3	
Medium	1347	8.9	0.90 (0.64–1.25)	380	10.4	1.37 (0.74–2.52)
High	752	6.1	0.60 (0.39–0.94)	296	8.9	0.88 (0.46–1.68)
Income						
Low	1044	12.0		302	7.2	
Medium	1044	8.0	0.86 (0.58–1.29)	349	8.7	1.08 (0.52–2.25)
High	1201	7.9	0.95 (0.66–1.37)	439	10.7	1.32 (0.68–2.55)
No answer	171	1.0	0.23 (0.05–1.15)	96	8.6	1.21 (0.43–3.37)
Smoking status						
Quitter	491	4.4		171	16.7	
Daily	2618	9.9	2.17 (1.30–3.64)	930	8.0	0.58 (0.28–1.20)
Non-daily	351	6.9	0.90 (0.46–1.76)	85	7.0	0.58 (0.21–1.64)
E-cigarette status						
Not at all	1926	4.9		626	4.4	
Daily	417	11.9	2.67 (1.65–4.33)	169	24.0	5.42 (2.70–10.89)
Weekly	347	18.3	3.48 (2.19–5.53)	106	19.6	4.19 (1.91–9.17)
Monthly	770	12.4	2.25 (1.53–3.33)	285	7.8	1.88 (0.97–3.63)
Survey mode						
Telephone	805	2.5	0.35 (0.20–0.63)	357	6.7	0.67 (0.38–1.15)
Internet	2655	10.6		829	10.2	

AOR = adjusted odds ratio, CI = confidence interval.
[a] Unweighted data.
[b] Weighted data.

low income. E-cigarette users were significantly more likely to have noticed advertisements on the internet than non-e-cigarette users. Daily smokers were significantly more likely to have noticed e-cigarette advertisements on the radio than participants who had quit smoking. Telephone survey participants were significantly more likely than internet participants to report having noticed advertisements on television, radio, posters and billboards, newspapers and magazines, and at point of sale (AU and UK).

3.2. Receiving free samples and discounts on e-cigarettes

US participants were significantly more likely to have received free samples of e-cigarettes in the last 6 months than participants from CA or AU (Table 3). No significant difference was found between US and UK participants. Participants aged 25–54 were significantly more likely to have received free samples than those over the age of 55. Participants who had a high education and who completed the survey via the telephone were significantly less likely to have received free samples. Participants who smoked daily were significantly more likely to have received free samples than those who had quit smoking. E-cigarette users were significantly more likely to have received free samples on e-cigarettes than non-e-cigarette users.

UK participants were significantly more likely than AU participants to have received special offers on e-cigarettes. Female participants were significantly less likely to have received special offers on e-cigarettes than male participants. Daily and weekly e-cigarette users were significantly more likely to have received special offers than non-e-cigarette users.

3.3. Perception of all they had seen or read as positive vs otherwise

Tables 4a and 4b show that overall, nearly half of participants in both AU (44.0%) and UK (47.8%) reported that all they had seen or read about e-cigarettes was positive. In both the analyzes when adjusting for exposure to advertising and when not, there was no significant difference between AU and UK participants. Participants with a high income were significantly more likely to have perceived what they had seen and read about e-cigarettes to be positive vs otherwise than participants with low income. This remained the case after controlling for exposure to e-cigarette advertisements. E-cigarette users were significantly more likely to have perceived what they had seen and read about e-cigarettes to be positive vs otherwise than non-e-cigarettes users.

When controlling for exposure to advertisements, daily and weekly e-cigarette users remained significantly more likely to have perceived what they had seen and read to be positive vs otherwise than non-e-

Table 4a
Self-reported positive interpretations of e-cigarette information by country (AU and UK only), demographics (left three columns) and exposure to advertisements (right three columns) (Aug 2013–Mar 2015), n = 1183.

	(n)[a]	Thinking about all you have read or seen about E-cigarettes, would you say it is…			
		Positive vs otherwise (without controlling for exposure to advertising)		Positive vs otherwise (after controlling for exposure to advertising)	
		% positive[b]	AOR (95% CI)	% positive[b]	AOR (95% CI)
Country					
UK	733	47.8	1.12 (0.78–1.59)	47.8	0.79 (0.53–1.18)
Australia	450	44.0		44.0	
Sex					
Female	653	43.0	0.85 (0.63–1.15)	43.0	0.89 (0.66–1.21)
Male	530	49.1		49.1	
Age					
18–24	49	45.1	1.05 (0.52–2.12)	45.1	0.86 (0.41–1.80)
25–39	247	49.5	1.17 (0.77–1.77)	49.5	1.05 (0.69–1.60)
40–54	430	45.5	0.98 (0.69–1.40)	45.5	0.88 (0.62–1.24)
55+	457	43.8		43.8	
Ethnicity					
White	1102	46.7	1.16 (0.66–2.06)	46.7	0.89 (0.66–1.21)
Non-white	81	41.4		41.4	
Education					
Low	508	46.2		46.2	
Medium	379	47.8	0.98 (0.68–1.40)	47.8	0.96 (0.67–1.37)
High	296	44.5	0.81 (0.55–1.19)	44.5	0.83 (0.56–1.24)
Income					
Low	302	38.4		38.4	
Medium	348	46.0	1.44 (0.96–2.16)	46.0	1.43 (0.94–2.17)
High	438	52.2	1.81 (1.22–2.68)	52.2	1.80 (1.20–2.70)
No answer	95	39.7	1.08 (0.58–2.01)	39.7	1.08 (0.59–1.98)
Smoking status					
Quitter	170	42.3		42.3	
Daily	928	47.4	1.66 (0.98–2.80)	47.4	1.74 (1.02–2.98)
Non-daily	85	42.9	1.48 (0.70–3.10)	42.9	1.62 (0.75–3.50)
E-cigarette status					
Not at all	624	39.4		39.4	
Daily	168	58.7	2.49 (1.55–4.01)	58.7	2.32 (1.40–3.85)
Weekly	106	59.8	2.13 (1.24–3.65)	59.8	2.06 (1.22–3.47)
Monthly	285	50.1	1.51 (1.05–2.16)	50.1	1.41 (0.98–2.03)
Survey mode					
Telephone	356	41.3	0.80 (0.57–1.12)	41.3	0.73 (0.51–1.04)
Internet	827	48.4		48.4	

AOR = adjusted odds ratio, CI = confidence interval.
[a] Unweighted data.
[b] Weighted data.

cigarette users. Daily smokers were significantly more likely to have perceived what they had seen and read to be positive vs otherwise than quitters after controlling for advertisements. In addition, participants who noticed advertisements on television, at point of sale and on the internet were significantly more likely to have perceived what they had seen and read to be positive vs otherwise than those who did not. However, participants who noticed advertisements in newspapers and magazines were significantly less likely to have positive perceptions than those who did not. There were no changes in the variables that were significantly associated with having positive perceptions before or after control for exposure to advertising.

4. Discussion & conclusions

The overall findings from this study show that participants from countries with less restrictive e-cigarette policies and permissive advertising regulations, the US and UK, were more likely to have noticed e-cigarette advertisements and received free samples/special offers than CA or AU participants. Nearly half of both AU and UK participants perceived what they had seen and read about e-cigarettes to be positive compared to equally balanced, negative or 'don't know'. There was no significant difference between participants in restrictive AU and less restrictive UK in perception of what they had seen and read about e-cigarettes as positive.

Across the four countries, television and the internet were two channels where participants reported to notice e-cigarette advertising the most. The proportion of participants noticing advertising via different forms of media could indicate that the salience of advertising is likely to vary across different media channels. Interestingly, the internet was a prominent source of advertising across all countries even in those where e-cigarette advertising was prohibited, CA and AU. Participants in the US and UK, were more likely to report that they had noticed e-cigarette advertising through all channels than CA and AU. This is potentially due to the increased money spent on advertising in countries with permissive regulations; e-cigarette companies in the US and UK have increased their e-cigarette advertising expenditure in recent years (De Andrade et al., 2013a; Kim et al., 2014; Kornfield et al., 2015). For example, the US tripled their expenditures from $6.4 million in 2011 to $18.3 million in 2012 (Kim et al., 2014). Furthermore, US participants were more likely to have noticed e-cigarette advertisements compared to the UK on all channels except posters, billboards, newspapers and magazines. This is potentially explained by differing marketing strategies in the two countries. For instance, one of the largest e-cigarette companies, Blu® e-cigarettes (previously owned by Lorillard Tobacco and recently sold to Imperial Tobacco in June 2015), promotes separate product lines in the US and UK (Blu E-cigarettes,

Table 4b
Self-reported positive interpretations of e-cigarette information by country (AU and UK only), demographics, and exposure to advertisements (Aug 2013–Mar 2015), $n = 1183$.

	(*n*)[a]	Thinking about all you have read or seen about e-cigarettes, would you say it is…	
		Positive vs otherwise (after controlling for exposure to advertising)	
		% positive[b]	AOR (95% CI)
Noticed ads on television			
Yes	292	56.2	1.71 (1.15–2.55)
No	891	42.7	
Noticed ads on radio			
Yes	95	63.6	1.45 (0.84–2.51)
No	1088	44.8	
Noticed ads on posters/ billboards			
Yes	242	55.5	1.39 (0.90–2.13)
No	941	43.6	
Noticed ads on newspapers/ magazines			
Yes	311	48.6	0.63 (0.41–0.95)
No	872	45.4	
Noticed ads on internet			
Yes	313	59.2	1.67 (1.18–2.36)
No	870	41.4	
Noticed ads at point of sale			
Yes	457	53.6	1.55 (1.10–2.18)
No	726	41.2	

AOR = adjusted odds ratio, CI = confidence interval.
[a] Unweighted data.
[b] Weighted data.

n.d.-a; Blu E-cigarettes, n.d.-b). In addition, in October 2014 the Advertising Standards Authority (ASA) in the UK introduced a voluntary agreement that governed e-cigarette advertising (McNeill et al., 2015). For example, advertisements could not promote any image associated with tobacco or undermine cessation messages. This regulated content in various advertisements in the UK; however, the UK survey ran from August to December 2014 and the agreement was introduced towards the end of data collection (53.7% of UK participants completed the survey after implementation of the restrictions), so influence is unknown. In the countries with restricted advertising regulations, AU had fewer participants report noticing e-cigarette advertisements than CA. This is potentially due to its isolated location in the world. CA has restrictions on advertising; however, it is located next to the US, where 75% of the Canadian population lives 100 miles from the US border (Thompson, 2014).

US participants were more likely to report receiving free samples of e-cigarettes than participants in CA and AU, and UK participants were more likely than AU participants to report that they had received special offers on e-cigarettes. This may reflect the e-cigarette regulations at the time; free samples and special offers were permitted in the US and UK but prohibited in CA and AU (De Andrade et al., 2013a; Global Tobacco Control, n.d.). E-cigarette users were more likely to have received both free samples and special offers on e-cigarettes than non-e-cigarette users, perhaps explained by e-cigarette users being a likely target and receptive audience. Free samples could also have been given when e-cigarette users purchased from stores on the internet. Daily smokers were more likely to receive free samples than those who had quit smoking, suggesting that it is daily rather than non-daily/ex-smokers who are targeted (De Andrade et al., 2013a; Delnevo et al., 2016; West et al., 2017) or they are perhaps more likely to visit stores where e-cigarettes are sold and samples offered. Furthermore, both e-cigarette users and smokers could have potentially sought out the free samples instead of receiving them opportunistically.

Participant's perceptions on what they had seen and read about e-cigarettes to be positive or negative was only asked in AU and UK. In both countries, nearly half of participants perceived what they had seen and read about e-cigarettes to be positive. However, there was no significant difference in positive perceptions between participants in AU and UK. This was unexpected because one might think that UK participants would be more likely to have a positive opinion than AU participants due to sales restrictions on e-cigarettes in AU. This question did however refer to all that participants had seen or read, and so potentially includes other communication sources such as new reports. A study looking at the representation of e-cigarettes in the UK media found a balanced coverage, if not slightly more positive than negative (Rooke and Amos, 2014). Future studies may however find differences between AU and UK because this study was conducted prior to the release of the Public Health England Report (McNeill et al., 2015) in the UK that emphasized that e-cigarettes are less harmful than smoking and may aid cessation (Public Health England, 2015).

This study has limitations. Self-report data are subject to memory recall and social desirability biases. The countries that permitted advertising had more participants that noticed e-cigarette advertising but there was likely some false reporting as well. Not all survey questions were asked across the four countries and this limits the comparison across a broad sample. In CA and AU, advertising of e-cigarettes was prohibited although advertisements for nicotine-free e-cigarettes are permitted. However, studies show that advertisements of nicotine-free e-cigarettes on television was negligible (Hammond et al., 2015; Durkin et al., 2016). This is a limitation of self-report, however the participants that reported noticing advertisements was low (19.0% in CA and 6.0% in AU). The higher number of participants in CA reporting exposure to e-cigarette advertising could perhaps be related to the leakage of advertising from the US.

Future research should explore changes in advertising regulations and the nuances in the differences between countries. This study provides a baseline for comparison of the impact of future policy changes. For example, advertising regulations have recently changed again in the UK and US. In May 2016, advertising was restricted in the UK, prohibiting advertising e-cigarettes on television, radio, newspapers, magazines and the internet but permitted blogs, posters, internet sales, and the cinema (UK Government, 2016). In the US, free samples of e-cigarettes were banned in August 2016 (Federal Drug Administration, 2016). In light of previous research suggesting an association between e-cigarette advertising and intention to use or use (Agaku et al., 2017; Collins et al., 2018), the effectiveness of these restrictions should be studied and evaluated.

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Conflict of interest

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