Social norms for e-cigarettes and smoking: associations with initiation of e-cigarette use, intentions to quit smoking and quit attempts. Findings from the EUREST-PLUS ITC Europe Surveys

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Abstract

Background

Social norms have received little attention in relation to electronic cigarettes (EC). The current study examine social norms for EC use and smoking tobacco, and their associations with (i) initiation of EC use, (ii) intention to quit smoking and (iii) attempts to quit smoking.

Methods

Cross-sectional and longitudinal data analysis from Waves 1 and 2 of the ITC 6 European Country Survey and corresponding waves from England (the ITC Four Country Smoking and Vaping Survey). Current smokers at baseline, who heard of ECs and provided data at both waves were included (n=3702). Complex samples logistic regression examined associations between the outcomes and descriptive (seeing EC use in public, close friends using ECs/ smoking) and injunctive (public approves of ECs/ smoking) norms, adjusting for country, demographics, EC use and heaviness of smoking.

Results

In longitudinal analyses, seeing EC use in public at least some days was the only social norm that predicted initiation of EC use between waves (OR=1.66, 95%CI=1.08, 2.56). In the cross-sectional analysis, having an intention to quit was associated with seeing EC use in public (OR=1.37, 95%CI=1.04, 1.81) and reporting fewer than three close friends smoke (OR=0.59, 95%CI=0.44, 0.80). There was no association between any social norm and making a quit attempt between waves.

Conclusions

Initiation of EC use is predicted by seeing EC use in public, which was also associated with greater intention to quit smoking. Friends' smoking was associated with lower intention to quit. These findings may allay concerns that increased visibility of ECs is renormalizing smoking amongst current smokers.

Keywords: Electronic cigarettes, cigarette smoking, social norms, longitudinal studies.

Introduction

The use of electronic cigarettes (ECs) has increased across Europe in recent years (1). Current prevalence estimates of those aged 15 and over report that 9% have tried using ECs once or twice and 2% currently use ECs in the European Union (EU). Within the United Kingdom (UK), 10% have tried using ECs and 5% are current users (2). As the number of those using ECs has increased, so have debates regarding the potential harms and benefits of ECs; some reports (3-5) have concluded that ECs carry significantly lower risk than smoking tobacco (referred to as 'smoking' from this point forward) and may aid cessation, while others have raised concerns about the unknown short and long-term health effects (6). Given that ECs can be considered as potentially harm-reducing for current smokers; this provides an argument for identifying key modifiable predictors for EC use.

Social norms are frequently investigated as predictors of health behaviours. These variables are also key components of models of behaviour, such as the Theory of Planned Behaviour (TPB) (7). This model includes *injunctive* social norms, which represent an evaluation of whether an individual feels that significant others or society as a whole thinks he/she should engage in the behaviour (7). As per the TPB, the more an individual feels that others approve of EC use, the more likely they are to intend to use ECs. In turn, this increases the likelihood of EC use. *Descriptive* social norms have also been examined as distinct predictors of behaviour (8). Descriptive social norms are beliefs about how others behave, for example the numbers of close friends, family members or society as a whole who use ECs. In addition to influencing behaviour through motivation, the social environment within which a behaviour takes place can also facilitate the uptake or maintenance of behaviour, for example by providing cues or opportunities for smoking to take place (9).

Cognitive measures of injunctive and descriptive social norms of smoking have been found to predict smoking onset, intentions to quit and attempts to quit smoking (10-14).

Further, having friends who smoke has frequently been found to predict onset of smoking in adolescents (15) and a reduction in the number of close friends who smoke has been found to be associated with greater likelihood of quit attempts and of quit success (16). Unsurprisingly, given the relatively recent emergence of EC use, research into associations between social norms and EC use is rarer, although results thus far suggest a similar pattern. Two longitudinal studies amongst youth found having friends who use ECs predicted subsequent initiation of EC use (17, 18). One of these also found that perceiving that one's best friend would react positively to EC use were associated with increased odds of subsequent EC initiation (18). Cross-sectional data has also found that the number of friends and family using ECs differs between smokers, EC users and those who use both products (19).

There are also data on the associations between EC use and social norms for smoking, and conversely, between smoking and social norms for EC use. In youth populations, trial of ECs has been predicted by having friends who smoke (20). The impact of EC social norms on smoking behaviour is of particular interest as concern has been raised that EC use has the potential to 'renormalise' smoking, for example if EC use becomes more accepted and visible in society, then by comparison smoking may also seem more acceptable (21, 22) which could deter motivation and attempts to quit smoking. Whether this is occurring has not yet been established. A study conducted amongst youth found that having friends who use ECs predicted initiation of smoking (17). However a study conducted amongst adults (23) found no evidence that those regularly exposed to EC use were less motivated to quit smoking or less likely to make a quit attempt than those who weren't regularly exposed.

Research questions

The current study analyses longitudinal data from Waves 1 and 2 of the International Tobacco Control Project 6 European Country Survey (ITC 6E, Germany, Greece, Hungary, Poland, Romania, and Spain) (24) and Waves 1 and 2 England data of the ITC Four Country Smoking and Vaping (ITC 4CV) Survey (25). Three research questions were addressed. First (i) the study examines whether descriptive and injunctive social norms for EC use and smoking, measured at Wave 1, predict initiation of EC use at Wave 2. Second (ii), we examine cross-sectional associations between descriptive and injunctive social norms for EC use and smoking and the intention to quit smoking, measured at Wave 1. Finally (iii), we will examine whether social norms for EC use and smoking, measured at Wave 1, predict attempts to quit smoking at Wave 2.

Methods

Participants and design

The current study is part of the Horizon 2020-funded EUREST-PLUS (European Regulatory Science on Tobacco: Policy implementation to reduce lung diseases) project (EUREST-PLUS-HCO-06-2015). The follow-up period for both studies was between 15 months and two years. Follow up Wave 1 of the English data from ITC 4CV used in the study was collected from July to November 2016 and Wave 2 data was collected between February and July 2018. The European data from ITC 6E was collected from June to September 2016 and February to May 2018, respectively. The sample size at Wave 1 of the ITC 6E survey was 6011, 3195 (69.6%) of whom completed survey at both waves. The sample size at Wave 1 of the ITC 4CV survey was 3536, 1394 (39.4%) of whom completed survey at both waves. Of the 4589 respondents from both surveys who provided data at each wave, in this analysis we included data from 3702 (80.7% of those with available data at both waves) who reported that they had heard of ECs at Wave 1, as this item was a pre-requisite for being asked to respond to EC social norm items. Further study and participant details are provided in Thompson et al (this volume).

Ethical clearance

The survey protocols and all materials, including the survey questionnaires, were cleared for ethics by the Office of Research Ethics, University of Waterloo, Canada and by local ethics boards in each study country. All respondents provided consent to participate.

Outcome measures

All variables were binary, or recoded as binary, except where indicated.

Initiation of EC use between Waves 1 and 2

At Waves 1 and 2, respondents were asked "Have you ever used an e-cigarette or vaping device, even one time?" with responses: yes/ no. For research question (i) only those responding 'no' at Wave 1 were included. Those responding 'yes' at Wave 2 were coded as having initiated EC use.

Intention to quit smoking

One item assessed intention to quit smoking at Wave 1: "Are you planning to quit smoking…" with responses classified into: planning to quit in the next 6 months (within the next month; within the next 6 months) vs all other responses (sometime in the future, beyond 6 months; not planning to quit, don't know).

Quit attempts

Attempts to quit smoking were assessed at Wave 2 using the item: "Have you made any attempts to stop smoking since we last spoke to you?" with responses yes/ no.

Predictor variables

Wording for certain items differed between the ITC 6E and ITC 4CV surveys. All social norms were recoded as dichotomous variables.

Social norms for EC use

Two items assessed descriptive social norms for EC use. The first, *friend EC use*, was assessed using different wording in the ITC 6E and ITC 4CV surveys. In the ITC 6E survey Friend EC use was assessed with the item: "Of the five closest friends or acquaintances that you spend time with on a regular basis, how many of them use e-cigarettes/vaping devices?"

with responses 0-5. In the ITC 4CV survey, friend EC use was assessed using two items. First, respondents were asked "How many friends or acquaintances do you spend time with on a regular basis?" with responses 0-5, More than 5. This was followed by "Of (these 1-5 / the 5 closest) friends or acquaintances that you spend time with on a regular basis, how many of them use e-cigarettes/vaping devices?" with responses 0-5. In both surveys, response options were recoded as none or ≥1. Those responding "don't know" were counted as missing data and excluded from the analysis. *Seeing EC use in public* was also assessed using different wording in the ITC 6E and ITC 4CV surveys. In the ITC 6E survey, seeing EC use in public was assessed using the item: "In the last 30 days, how often have you seen anyone using an e-cigarette or vaping device in public?". In the ITC 4CV survey, seeing EC use in public was assessed using the item "In the last 30 days, how often, if at all, have you seen anyone vaping (using e-cigarettes) in public?". In both cases, responses were recoded as at least some days (every day, most days, some days) versus all other responses (rarely, not at all, or don't know).

One item assessed injunctive social norms. In the ITC 6E survey, this was assessed using the item: "What do you think the general public's attitude is towards using e-cigarettes or vaping devices?". In the ITC 4CV survey, this was assessed using "What do you think the general public's attitude is towards vaping/ using e-cigarettes (ITC 4CV). Responses were recoded as approves (strongly approves, approves) versus does not approve (neither approves or disapproves; somewhat disapproves; strongly disapproves, don't know).

Social norms for smoking

One item assessed descriptive social norms for smoking assessed using different wording in the ITC 6E and ITC 4CV surveys. In the ITC 6E survey, *Friend smoking* was assessed a single item: "Of the five closest friends or acquaintances that you spend time with on a

regular basis… How many of them smoke ordinary cigarettes?, with responses 0-5. In the ITC 4CV survey, respondents were asked two questions "How many friends or acquaintances do you spend time with on a regular basis? 0-5, More than 5", followed by "Of (these 1-5 / the 5 closest) friends or acquaintances that you spend time with on a regular basis, how many of them smoke ordinary cigarettes? With responses 0-5". As the prevalence of smoking cigarettes is higher than using ECs in the countries where data were collected, these were coded differently to the corresponding EC item as ≤ 2 or ≥3 friends who smoke. As above, those responding "don't know" were counted as missing data and excluded from the analysis. One item assessed injunctive social norms for smoking, assessed using the same item in both surveys, "What do you think the general public's attitude is towards smoking cigarettes?", recoded as approve (strongly approves, somewhat approves) or does not approve (somewhat disapproves, strongly disapproves, neither approves nor disapproves, don't know).

Covariates

Covariates included in all multivariable analyses were age, sex, income, education and country. Analyses examining the intention to quit smoking and attempts to quit smoking also controlled for the heaviness of smoking index (continuous variable with a range of 0-6 (26) and current use of ECs (all respondents reporting current use of ECs, either daily, weekly or less than weekly/ occasional were coded as current users and compared to all other responses). Analyses examining attempts to quit smoking further controlled for the intention to quit smoking. All covariates were assessed at Wave 1.

Analysis

Logistic regression analyses were conducted to examine: (i) prospective associations between descriptive and injunctive EC social norms at Wave 1 and the initiation of EC use (reporting

having ever used ECs) at Wave 2; (ii) cross-sectional associations between descriptive and injunctive EC social norms at Wave 1 and the intention to quit smoking at Wave 1; and (iii) prospective associations between descriptive and injunctive EC social norms at Wave 1 and attempts to quit smoking at Wave 2. Analyses for (i) were restricted to those who reported never having used ECs at Wave 1 and who provided a response to the item on ever use of ECs at Wave 2. For each analysis, both unadjusted and adjusted (see covariates section, above) complex samples logistic regression analyses were conducted. We calculated and reported odds ratios and corresponding 95% CI for each predictor variable. Odds ratios for ORs for individual variables were adjusted for all other variables in each model. Longitudinal (for analyses (i) and (iii) and cross-sectional for (ii) sampling weights and strata will be applied in each model. Complete case analysis was used. Cases where respondents refused to answer an item were always counted as missing data. All analyses were conducted using IBM SPSS 25.

Results

Participant characteristics at baseline for the two analytic samples are shown in Table 1. England provided the largest proportion of respondents for the cross-sectional and longitudinal datasets (29.0% and 37.0% respectively). There was a majority of male participants in both datasets (55.0% and 56.2% respectively) and most participants were in the 25-54 age range (63.6% and 63.2% respectively). The vast majority of respondents in both datasets were daily smokers (93.4 and 92.7, respectively).

(i) Prospective associations between EC social norms and the initiation of EC use

A total of 1758/ 3702 (47.5%) respondents reported that they had never used ECs at Wave 1 and provided data on ever use of ECs at follow-up. Of those reporting never having used ECs at Wave 1, 17.2% (n=302) reported that they had initiated EC use (reported ever use) at Wave 2. Results of bivariate and multivariable analyses predicting initiation of EC use are shown in Table 2. In multivariable analyses, only one social norms variable remained predictive; reporting seeing EC use at least some days increased the odds of having tried ECs at Wave 2 (OR=1.66, 95%CI=1.08, 2.56, p=.020). Country and age also significantly predicted the initiation of EC use between waves (p<.001 and p=.001 respectively).

(ii) Cross-sectional associations between EC social norms and the intention to quit smoking

The second set of analyses (Table 3) examined the cross-sectional associations between EC and smoking social norms and intending to quit smoking within the next six months among all respondents. In multivariable analyses, only two social norm variables remained significant; reporting seeing EC use in public at least some days increased the odds of intending to quit (OR=1.37, 95%CI=1.04, 1.81, p=.024), whereas reporting three or more of their close friends smoke decreased the odds (OR=0.59, 95%CI=0.44, 0.80, p<.001).

Intention to quit smoking was also significantly associated with country (p<.001), gender (p=.023) and age (p=.017).

(iii) Prospective associations between EC social norms and attempts to quit smoking

The final set of analyses examined the prospective association between social norms and having made a quit attempt between waves (Table 4). There was no association in multivariable analyses between any EC or smoking social norm variable and making a quit attempt. Attempting to quit smoking between waves was predicted by country (p=.009), intention to quit smoking (p<.001) and use of ECs at Wave 1 (p=.036).

Discussion

The current study examined the associations between descriptive and injunctive social norms for EC use and smoking with initiation of EC use, the intention to quit and attempts to quit smoking. Only two out of five examined social norms, both descriptive, were associated with outcome variables in multivariable analyses. Having three or more friends who smoke was associated with reduced odds of intending to quit smoking and the frequency of seeing EC use in public was associated with increased odds of intending to quit, both in cross-sectional analyses. The frequency of seeing EC use in public was also associated with increased odds of initiating EC use between waves. None of the social norm variables examined here predicted whether participants made an attempt to quit smoking between waves.

There are different pathways through which seeing people use ECs in public could increase the likelihood of initiating use. Seeing others use ECs could provide cues or opportunities for EC use to take place (e.g. (9)). Alternatively, it could increase susceptibility or intention to use ECs (19, 27) or motivate use by increasing perceptions of reduced harm relative to cigarettes (28). Based on these analyses, it does not appear that increased visibility of vaping is 'renormalising' tobacco use amongst smokers and reducing their motivation to quit (21, 22) as seeing EC use in public was associated greater odds of intending to quit smoking. This result differs from that of a recent study (23) using data collected from smokers in England which found no association between regular exposure to EC use and motivation to quit smoking. The different findings could be due to the difference in how exposure to EC use was measured; the previous study (23) looked at the impact of reporting that people used ECs around them 'regularly', whereas the current study examined the impact of frequency of seeing people vaping in public 'at least some days'. However, in either study, there was no support for the hypothesis that exposure to vaping decreased the intention to quit smoking. Rather, being exposed to smoking, in the form of having friends who smoke,

was significantly, negatively associated with the intention to quit, as were descriptive social norms for smoking in the previous study (23). We found no evidence that injunctive social norms, either for smoking tobacco or for EC use, were associated with the initiation of EC use. In general this is in keeping with the evidence base as findings on the association between injunctive norms and smoking behaviour or EC use have tended to be mixed (for example (17, 18)).

Descriptive EC social norms also did not impact negatively on attempts to quit smoking, although on this occasion there was also no positive association. Rather, we found no evidence that any social norm variable, either for EC use or for smoking, was associated with actual attempts to quit. One potential explanation for the difference in the association between cognitive social norm variables and the initiation of EC use compared to attempts to quit smoking is theoretical; specifically that the uptake of novel behaviours is more readily predicted by cognitive variables such as social norms than the cessation of behaviours that have been performed regularly over time (29).

This study had several limitations. The analyses examining associations between social norms and the intention to quit smoking were based on cross-sectional data meaning we cannot infer causality. Associations between EC social norms and the two behavioural outcomes: initiation of EC use and attempts to quit smoking, were, however, strengthened by the use of prospective data. Although attempts were made to control for numerous potential covariates, some important variables may have been omitted, for example we did not control for whether respondents had made prior attempts to quit in the analysis of whether social norms were associated prospectively with having made a quit attempt between waves. A further limitation is the use of self-report data, which leaves open the possibility that some of these findings, in particular those using cross-sectional data, could be attributed to common method bias (30). The wording of some social norms items differed marginally between the

ITC 6E and ITC 4CV surveys, and differences in norms between England and the countries contributing to the ITC 6E have been reported (31). This may have impacted negatively on the internal consistency of the variables used in analyses. As has been noted elsewhere (32), the exclusion of never smokers from the current study limits the generalisability of the associations between EC social norms and the initiation of EC use. Future studies should seek to examine these associations in those who have never smoked. Finally, the power to detect differences for some comparisons may have been limited by small cell sizes.

Conclusions

This study has two main conclusions. First, as would be predicted by theoretical models of behaviour, the initiation of EC use is predicted by descriptive social norms for EC use, in particular seeing EC use in public at least some of the time. The second main conclusion is that although social norms for smoking, in terms of having three or more close friends who smoke, are negatively associated with the intention to quit, seeing EC use in public is positively associated with the intention to quit smoking. These findings may allay concerns that increasing visibility and use of ECs in society is renormalizing tobacco smoking amongst current smokers.

Key points:

- The initiation of EC use is predicted by descriptive social norms for EC use, namely seeing EC use in public at least some of the time.
- Social norms for smoking, in terms of having three or more close friends who smoke, are negatively associated with the intention to quit, whereas seeing EC use in public is positively associated with the intention to quit.
- These findings should allay concerns that increasing visibility and use of ECs in society is renormalizing tobacco smoking amongst current smokers.

Funding

The EUREST-PLUS project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 681109 (CIV) and the University of Waterloo (GTF). Additional support was provided to the University of Waterloo by a foundation grant from the Canadian Institutes of Health Research (FDN-148477). GTF was supported by a Senior Investigator Grant from the Ontario Institute for Cancer Research. EF is partly supported by Ministry of Universities and Research, Government of Catalonia (2017SGR319) and by the Instituto Carlos III and co-funded by the European Regional Development Fund (FEDER) (INT16/00211 and INT17/00103), Government of Spain. EF thanks CERCA Programme Generalitat de Catalunya for the institutional support to IDIBELL. The ITC England Survey of the ITC 4 Country Smoking and Vaping Survey was supported by grants from the US National Cancer Institute (P01 CA200512) and the Canadian Institutes of Health Research (FDN-148477).

Conflicts of interest

The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results. GTF has served as an expert witness on behalf of governments in litigation involving the tobacco industry. AM is a UK National Institute for Health Research (NIHR) Senior Investigator. The views expressed in this article are those of the authors and not necessarily those of the NIHR, or the UK Department of Health and Social Care.

Acknowledgments

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Table 1. Baseline characteristics in 2016 of current smokers from seven European countries reporting having heard about electronic cigarettes (EC) and who contributed data to samples for research question (i) (n=1758) and (ii) and (iii) (n=3702).

	Subsample of current smokers who heard about ECs but have not used ECs at baseline (n=1758) (Research question i)		Total sample (n=3702) (Research questions ii and iii)	
Country	n[a]	%[b]	n[a]	%[b]
Germany	262	14.0	452	12.1
Greece	161	9.9	280	8.0
Hungary	149	7.9	251	6.7
Poland	153	8.9	351	9.3
Romania	170	9.5	364	10.4
Spain	393	20.8	614	16.6
England	470	29.0	1390	37.0
Gender				
Male	883	55.0	1845	56.2
Female	875	45.0	1857	43.8
Age				
18-24	104	6.5	311	12.6
25-39	397	25.1	894	31.8
40-54	664	38.5	1291	31.4
55 and over	594	29.9	32.6	24.2
Monthly household income				
Low	417	22.3	861	21.2
Moderate	620	33.9	1284	33.3
High	355	21.8	894	25.6
Not stated	366	22.0	663	19.9
Highest level of education				
Low	690	35.2	1342	32.3
Moderate	807	52.8	1672	55.7
High	248	12.0	661	12.0
Smoking status				
Daily	1655	93.4	3447	92.7
Non-daily	103	6.6	183	7.3
EC use status				
Daily	0	0	151	6.3
Non-daily	0	0	553	14.0
No current use	1758	100	2998	79.7
Heaviness of smoking index (mean (SD))	2.35 (0.05)		2.49 (0.04)	
Intention to quit smoking at W1				
Intends to quit	267	15.1	737	19.4
Does not intend to quit	1490	84.9	2693	80.6
Made an attempt to quit smoking (Wave 2)				
Yes	300	19.7	1045	71.8
No	1457	80.3	2656	28.2

	Subsample of current smokers who heard about ECs but have not used ECs at baseline (n=1758) (Research question i)		Total sample (n=3702) (Research questions ii and iii)	
Number of five closest friends who use ECs				
At least one	216	13.9	700	20.3
None	1426	86.1	2704	79.7
Frequency of seeing EC use in public				
At least some days	587	35.1	1676	45.6
All other responses	1168	64.9	2022	54.4
General public's attitude towards ECs				
Approves	409	24.5	989	25.9
Does not approve	1348	75.5	2712	74.1
Number of five closest friends who smoke				
Three or more	985	59.6	1896	56.6
Two or fewer	661	40.4	1527	43.4
General public's attitude towards smoking				
Approves	206	11.8	416	11.8
Does not approve	1552	88.2	3286	88.2

[a] unweighted, [b] weighted. Details of sample for research question (i): Longitudinal sample, restricted to those who reported never having used ECs at Wave 1 and who provided a response to the item on ever use of ECs at Wave 2. Details of sample for research questions (ii) and (iii): All respondents who completed surveys at both waves and reported that they had heard of ECs at Wave 1.

Table 2 Prospective associations between descriptive and injunctive social norms at Wave 1 and the initiation of EC use at Wave 2 (n=1758)

	Initiated EC use between Waves 1 and 2		**Associations between predictor variables and initiating EC use between waves (n= 1758)**	
			Bivariate	Multivariable
	n/N	%	OR (95% CI)	OR (95% CI)
Number of five closest friends who use ECs				
At least one	53/216	26.5	**1.63 (1.01-2.62)**	1.38 (0.81-2.34)
None	223/1426	18.1	1.00	1.00
Frequency of seeing EC use in public				
At least some days	159/587	31.0	**2.87 (2.05-4.03)**	**1.66 (1.08-2.56)**
All other responses	142/1168	13.5	1.00	1.00
General public's attitude towards ECs				
Approves	85/409	24.4	1.45 (0.99-2.10)	1.24 (0.80-1.92)
Does not approve	217/1348	18.2	1.00	1.00
Number of five closest friends who smoke				
Three or more	140/985	16.3	**0.61 (0.43-0.86)**	1.08 (0.69-1.68)
Two or fewer	139/661	24.2	1.00	1.00
General public's attitude towards smoking				
Approves	27/206	19.1	0.95 (0.52-1.75)	1.03 (0.53-1.99)
Does not approve	275/1552	19.8	1.00	1.00
Country				
Germany	45/262	20.7	**0.50 (0.29-0.85)**	0.66 (0.34-1.25)
Greece	35/161	18.6	**0.44 (0.27-0.71)**	**0.43 (0.23-0.84)**
Hungary	12/149	9.8	**0.21 (0.10-0.44)**	**0.28 (0.12-0.67)**
Poland	10/153	8.8	**0.19 (0.08-0.42)**	**0.19 (0.08-0.46)**
Romania	23/170	17.6	**0.41 (0.22-0.76)**	**0.47 (0.22-0.96)**
Spain	38/393	9.1	**0.19 (0.12-0.31)**	**0.25 (0.13-0.47)**
England	139/470	34.3	1.00	1.00
Gender				
Female	140/735	17.0	0.74 (0.53-1.02)	0.86 (0.61-1.21)
Male	162/721	21.7	1.00	1.00
Age				
25-39	87/397	23.7	**0.50 (0.27-0.92)**	**0.50 (0.26-0.97)**
40-54	113/664	16.3	**0.31 (0.17-0.57)**	**0.37 (0.20-0.69)**
55 and over	74/593	13.3	**0.25 (0.13-0.46)**	**0.27 (0.14-0.52)**
18-24	28/104	38.4	1.00	1.00
Annual income				
Low	68/417	16.0	**0.47 (0.30-0.74)**	0.93 (0.54-1.60)
Moderate	116/620	21.0	0.66 (0.43-1.00)	1.02 (0.63-1.66)
Not stated	36/366	12.5	**0.35 (0.19-0.65)**	0.80 (0.40-1.58)
High	82/355	28.9	1.00	1.00
Highest level of education				
Low	116/690	18.40	0.84 (0.51-1.39)	1.10 (0.61-1.97)
Moderate	130/807	19.4	0.99 (0.55-1.46)	1.00 (0.59-1.74)

	Initiated EC use between Waves 1 and 2		**Associations between predictor variables and initiating EC use between waves (n= 1758)**	
			Bivariate	Multivariable
	n/N	%	OR (95% CI)	OR (95% CI)
High	53/248	21.1	1.00	1.00
Numbers (n/N) are unweighted, percentages are based on weighted data; analysis only include those reporting never having used ECs at Wave 1 and who provided a response to the item on ever use of ECs at Wave 2. Significant associations are in bold.				

Table 3 Cross-sectional associations between descriptive and injunctive EC social norms at Wave 1 and the intention to quit smoking at Wave 1 (n=3702)

	Intends to quit at W1		**Associations between predictor variables and intending to quit smoking (n=3702)**	
			Bivariate	Multivariable
	n/N	%	OR (95% CI)	OR (95% CI)
Number of five closest friends who use ECs				
At least one	158/699	20.8	1.20 (0.94-1.53)	0.99 (0.74-1.32)
None	508/2704	18.0	1.00	1.00
Frequency of seeing EC use in public				
At least some days	439/1675	25.5	**2.18 (1.77-2.67)**	**1.37 (1.04-1.81)**
All other responses	298/2021	13.6	1.00	1.00
General public's attitude towards ECs				
Approves	220/989	20.8	1.18 (0.94-1.48)	1.13 (0.88-1.44)
Does not approve	517/2710	18.2	1.00	1.00
Number of five closest friends who smoke				
Three or more	244/1896	11.7	**0.36 (0.29-0.44)**	**0.59 (0.44-0.80)**
Two or fewer	422/1526	27.1	1.00	1.00
General public's attitude towards smoking				
Approves	58/416	13.6	**0.65 (0.45-0.94)**	1.07 (0.71-1.61)
Does not approve	679/3284	19.6	1.00	1.00
Country				
Germany	57/452	12.3	**0.32 (0.23-0.46)**	**0.52 (0.33-0.81)**
Greece	32/280	10.0	**0.25 (0.16-0.41)**	**0.45 (0.26-0.80)**
Hungary	28/251	11.1	**0.28 (0.16-0.50)**	0.53 (0.27-1.02)
Poland	38/351	8.3	**0.21 (0.13-0.34)**	**0.34 (0.18-0.65)**
Romania	51/364	13.6	**0.36 (0.25-0.52)**	0.73 (0.44-1.20)
Spain	99/614	14.9	**0.40 (0.30-0.53)**	0.82 (0.54-1.25)
England	432/1388	30.5	1.00	1.00
Gender				
Female	402/1856	21.3	**1.35 (1.10-1.65)**	1.19 (0.95-1.48)
Male	335/1844	16.8	1.00	1.00
Age				
25-39	189/893	21.7	**1.99 (1.28-3.08)**	**2.00 (1.25-3.19)**
40-54	266/1291	18.7	**1.65 (1.09-2.48)**	**1.62 (1.03-2.53)**
55 and over	223/1205	18.4	**1.61 (1.05-2.47)**	1.44 (0.89-2.32)
18-24	59/311	12.2	1.00	1.00
Annual income				
Low	154/861	17.0	**0.64 (0.48-0.84)**	0.79 (0.57-1.10)
Moderate	246/1284	18.6	**0.71 (0.55-0.92)**	0.84 (0.62-1.13)
Not stated	96/662	14.8	**0.54 (0.39-0.75)**	0.74 (0.51-1.09)
High	241/893	24.3	1.00	1.00
Highest level of education				
Low	226/1342	15.4	**0.61 (0.47-0.79)**	0.97 (0.71-1.33)
Moderate	313/1672	20.1	0.84 (0.65-1.08)	1.01 (0.75-1.35)
High	193/659	23.0	1.00	1.00
Use of ECs at W1				

	Intends to quit at W1		**Associations between predictor variables and intending to quit smoking (n=3702)**	
			Bivariate	Multivariable
	n/N	%	OR (95% CI)	OR (95% CI)
Current use	263/703	35.5	**2.95 (2.33-3.74)**	**1.78 (1.31-2.41)**
No current use	474/2997	15.7	1.00	1.00
Heaviness of Smoking Index[a]			**0.83 (0.78-0.89)**	**0.89 (0.82-0.95)**
Percentages are based on weighted data. Analysis includes all respondents who completed surveys at both waves and reported that they had heard of ECs at Wave 1. [a] Mean (SD) = 2.16 (1.52) for those intending to quit, 2.57 (1.55) for those not intending to quit.				

Table 4 Prospective associations between descriptive and injunctive EC social norms at Wave 1 and attempts to quit smoking at Wave 2 (n=3702)

	Makes an attempt to quit between waves		**Associations between predictor variables and making an attempt to quit between Waves (n=3702)**	
			Bivariate	Multivariable
	n/N	%	OR (95% CI)	OR (95% CI)
Number of close friends who use ECs				
At least one	212/700	30.9	1.19 (0.93-1.54)	1.10 (0.83-1.46)
None	752/2703	27.3	1.00	1.00
Frequency of seeing EC use in public				
At least some days	507/1676	30.1	1.20 (0.98-1.46)	0.94 (0.71-1.24)
All other responses	535/2021	26.5	1.00	1.00
General public's attitude towards ECs				
Approves	284/989	27.5	0.95 (0.76-1.19)	0.86 (0.67-1.11)
Does not approve	761/2711	28.5	1.00	1.00
Number of close friends who smoke				
Three or more	479/1895	24.9	**0.70 (0.57-0.85)**	0.97 (0.75-1.25)
Two or fewer	489/1527	32.2	1.00	1.00
General public's attitude towards smoking				
Approves	104/416	24.4	0.80 (0.58-1.11)	0.91 (0.64-1.28)
Does not approve	941/3285	28.7	1.00	1.00
Country				
Germany	91/452	18.5	**0.44 (0.32-0.61)**	**0.57 (0.38-0.84)**
Greece	64/280	25.2	**0.66 (0.45-0.98)**	0.98 (0.61-1.59)
Hungary	51/251	18.1	**0.43 (0.29-0.65)**	0.72 (0.44-1.17)
Poland	85/351	27.5	0.74 (0.52-1.07)	1.01 (0.63-1.61)
Romania	121/364	29.5	0.82 (0.59-1.13)	1.13 (0.73-1.73)
Spain	175/613	27.9	**0.76 (0.58-0.99)**	1.07 (0.72-1.60)
England	458/1390	33.8	1.00	1.00
Gender				
Female	545/1857	31.1	**1.28 (1.06-1.56)**	1.20 (0.97-1.48)
Male	500/1844	26.0	1.00	1.00
Age				
25-39	262/894	30.6	0.84 (0.58-1.22)	0.81 (0.55-1.21)
40-54	336/1291	25.2	**0.64 (0.45-0.92)**	0.73 (0.50-1.07)
55 and over	335/1206	25.7	**0.66 (0.46-0.95)**	0.74 (0.50-1.09)
18-24	112/310	34.4	1.00	1.00
Annual income				
Low	226/861	27.9	0.92 (0.69-1.23)	1.02 (0.73-1.43)
Moderate	366/1284	29.5	0.99 (0.77-1.29)	1.15 (0.86-1.55)
Not stated	169/662	24.4	0.76 (0.56-1.04)	0.83 (0.58-1.18)
High	284/894	29.7	1.00	1.00
Highest level of education				
Low	340/1342	23.7	**0.61 (0.45-0.83)**	0.83 (0.58-1.18)
Moderate	483/1671	29.8	0.84 (0.63-1.12)	0.89 (0.65-1.22)
High	217/661	33.6	1.00	1.00

	Makes an attempt to quit between waves		Associations between predictor variables and making an attempt to quit between Waves (n=3702)	
			Bivariate	Multivariable
	n/N	%	OR (95% CI)	OR (95% CI)
Intention to quit smoking at W1				
Intends to quit	356/737	46.3	**2.75 (2.17-3.49)**	**2.29 (1.77-2.94)**
Does not intend to quit	688/2962	23.8	1.00	1.00
Use of ECs at W1				
Current use	218/479	42.4	**1.84 (1.43-2.38)**	**1.45 (1.03-2.05)**
No current use	827/2395	26.3	1.00	1.00
Heaviness of Smoking Index [a]				0.94 (0.87-1.00)

Percentages are based on weighted data. Analysis includes all respondents who completed surveys at both waves and reported that they had heard of ECs at Wave 1.

[a] Mean (SD) = 2.30 (1.55) for those who made an attempt to quit between waves, 2.56 (1.54) for those who did not.