Exposure to smoking tobacco, roll-your-own tobacco, heated tobacco product, and e-cigarette advertising in 28 European countries

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ABSTRACT

INTRODUCTION Exposure to tobacco product advertising, promotion, and sponsorship remains a challenge to tobacco control in many areas across the globe. The objective of this study was to explore the prevalence, sources and factors associated with exposure to advertising of heated tobacco products (HTPs), e-cigarettes and smoking tobacco across 28 European countries.

METHODS We performed a secondary analysis of wave 93.2 of the Eurobarometer survey, which was conducted in 28 European countries during August–September 2020. Respondents were requested to provide detailed information on their exposure to tobacco advertising through multiple sources, its frequency and their demographical characteristics. Weighting was performed within all descriptive analyses to account for the sampling design.

RESULTS The reported exposure to advertising of smoking tobacco, e-cigarettes and HTPs was 34.6% (95% CI: 33.7–35.6), 39.3% (95% CI: 38.4–40.4) and 28.2% (95% CI: 27.4–29.2), respectively. The overall prevalence of frequent exposure to smoking tobacco advertising was 4.3% (95% CI: 3.9–4.7); however, exposure to advertising of smoking tobacco products differed significantly across the 28 European countries surveyed. Frequent exposure to e-cigarette advertising was reported by 6.8% (95% CI: 6.3–7.4) of all respondents, with the United Kingdom (21.6%) and Ireland (14.1%) having the highest prevalence of frequent exposure. Higher exposure to advertising of tobacco and nicotine products was reported by those aged 15–24 years for smoking tobacco products (AOR=1.35; 95% CI: 1.22–1.49), e-cigarettes (AOR=1.88; 95% CI: 1.70–2.07), and HTPs (AOR=1.92; 95% CI: 1.73–2.13) compared to older participants.

CONCLUSIONS Our analyses indicate cross-country differences in exposure to advertising of smoking tobacco, e-cigarettes and HTPs and highlight sociodemographic characteristics associated with specific exposure routes of advertising in Europe. The current findings provide an evidence base that may fuel discussions related to potential revisions of the European Tobacco Advertising Directive.

INTRODUCTION

Exposure to tobacco product advertising, promotion, and sponsorship through points of sale (POS), billboard advertising, mass media, and online channels remains a challenge to tobacco control and tobacco endgame in many areas across the globe[1,2]. Cohort studies consistently suggest that exposure to tobacco advertising and promotion is associated with the likelihood that adolescents will start to smoke[2]. At the same time, there is also substantial evidence that advertising has an effect on cessation efforts[3], encourages tobacco consumption[4] and there is also evidence that advertising of one type of product may indirectly promote the use of others (e.g. e-cigarette advertising increasing cigarette use)[5,6].

In addition to cigarettes and roll-your-own tobacco, within the past decade, a plethora of new nicotine-containing

products have emerged, leading to the development of electronic cigarettes (e-cigarettes) and, more recently, heated tobacco products (HTPs). Recent analyses of the 2020 Eurobarometer indicated that overall, 6.5% of participants had ever used an HTP, while youth aged 15–24 years were more than seven times more likely to report experimentation with HTPs compared to those aged ≥55 years[7]. This recent entrance of e-cigarettes and HTPs into the European market has added further complexity to tobacco product regulation and monitoring, with increased product awareness and experimentation among the general public[7,8] and smokers[9], and across other jurisdictions[10].

In contradiction to other tobacco control measures that regulate product design and product reporting, the regulation of tobacco product advertising is heterogeneous across Europe. Visibility of tobacco products at POS, in settings where open display of tobacco is allowed, is one of the last remaining ways in which the tobacco industry can promote their products in some jurisdictions both in Europe[11] and internationally[12,13]. Furthermore, online advertising has been noted as an important source of exposure to e-cigarettes[14-17]. While POS advertising of HTPs and e-cigarettes has been assessed as an advertising route in other jurisdictions[18-20], there is limited cross-country evidence of the recent level of exposure of the European population to advertising of tobacco products, e-cigarettes, and HTPs[21-24].

In light of the increased interest and concern related to exposure and experimentation with other nicotine-containing products, and in light of the very obsolete European Union's Tobacco Advertising Directive (TAD), which has not been updated since 2003, the objective of this study was to explore the prevalence, sources and factors associated with exposure to advertising of HTPs, e-cigarettes and smoking tobacco (cigarettes and roll-your-own) across 28 European countries in 2020.

METHODS

Data source

We performed a secondary analysis of data from wave 93.2 of the Eurobarometer survey, which was conducted in 28 European countries (the 27 member states of the European Union and the United Kingdom). Data were collected in August–September 2020 with a combination of face-to-face and online interviews. Eurobarometer surveys normally follow a multi-stage sampling design with primary sampling units (PSU) selected from each region within each country, proportional to population size. Within each PSU, starting addresses are randomly selected and a standard random route is followed to systematically select participating households. One person in each household is interviewed face-to-face in the local language following the closest birthday rule. Due to COVID-19 restrictions at the time of the survey, interviews were conducted exclusively online in six countries (Estonia, Finland, Ireland, Luxembourg, Sweden, United Kingdom), while data were collected through a mix of online and face-to-face interviews in four countries (Belgium, Denmark, Spain, Netherlands). All online samples were selected through a probabilistic design. Post-stratification and population size weights available in the Eurobarometer dataset ensure that samples are nationally representative in terms of age, sex, and residence (urban/rural). A total of 28300 individuals aged ≥15 years were interviewed in 28 countries.

Measures

Tobacco smoking

All individuals were asked: 'Regarding smoking cigarettes, cigars, or a pipe, which of the following applies to you?'. Responses included: 'You currently smoke' (current smokers); 'You used to smoke but you have stopped' (former smokers); and 'You have never smoked' (never smokers).

Exposure to advertising

Respondents were asked: 'In the past 12 months, have you seen advertisements or promotions for the following products in (OUR COUNTRY)? – smoking tobacco products; e-cigarettes, liquids or refill cartridges; and HTPs'. Response options included 'often'; 'from time to time'; 'rarely'; 'never'; and 'don't know'. We analyzed frequent (i.e. 'often') and any exposure to advertising (i.e. 'often', 'from time to time' or 'rarely').

Sources of exposure to advertising

All those who reported having seen advertisements of tobacco products were asked to report where they had seen these advertisements or promotions. Those who reported exposure to e-cigarette advertising but not to HTP advertising were asked to report sources of exposure to e-cigarette advertising. Similarly, those who reported exposure to HTP advertising but not e-cigarette advertising were asked to report sources of HTP advertising. In all cases, we classified sources of advertising into 'online' (social networks or blogs, retailers' websites, other websites, and through mobile phone applications); 'public places' (billboards, posters, or other types of advertising in public spaces, railway stations or airports, and inflight magazines); 'TV/movies' (TV shows or movies and in cinemas); and 'events and other promotions' (events sponsored or organized by the tobacco/e-cigarette companies, through sales of other products, through free distribution or distribution of promotional items and around cafes or bars). The Eurobarometer 2020 dataset reported the above responses for e-cigarettes and HTPs as one merged category.

Internet use

Participants were asked if and how often they use the internet at home, at work, on their mobile device, or somewhere else. We classified responses into 'daily' (every day or almost every day in any of the locations); 'less than daily' (two or three times a week, about once a week, two or

three times a month, or less often); and 'never' (never or no internet access in all of the locations).

Sociodemographic data

The survey collected data on age (15–24; 25–39; 40–54; and ≥55 years), sex (male, female), education level (up to lower secondary; upper secondary; tertiary up to Bachelor's; Master's or higher), difficulties to pay bills during the last twelve months (almost never/never; and from time to time/most of the time), and residence (rural, urban).

Statistical analysis

We analyzed data using two-level multivariable logistic regression models accounting for clustering of observations within countries. The first set of models assessed the association of exposure to any and frequent advertising of smoking tobacco, HTPs, and e-cigarettes with sociodemographic factors. Such factors included sex, age, difficulty paying bills, residence, education level, internet access, and smoking. The second set of models assessed the association between the same independent variables and reporting of each source of advertising, separately for smoking tobacco and for e-cigarettes/HTPs among those who reported any exposure to advertising of the respective products. Official Eurobarometer weights were incorporated for all descriptive analyses to account for the sampling design. Descriptive results are presented as weighted % with 95% confidence interval (95% CI). Regression results are presented as adjusted odds ratios (AORs) with 95% CI. All analyses were conducted using Stata 15.0.

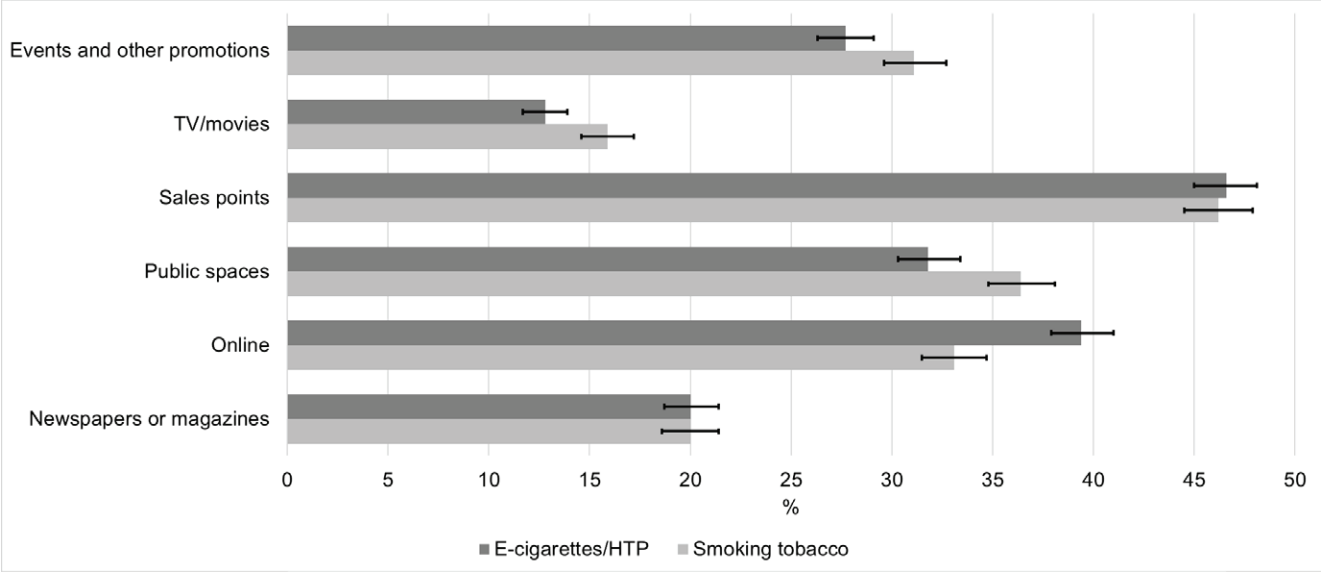
RESULTS

Overall exposure of European adults to advertising of tobacco and nicotine products in 2020 is depicted in Table 1. Exposure to advertising of smoking tobacco products differed significantly across the 28 European countries surveyed. The overall prevalence of frequent exposure to smoking tobacco advertising was 4.3% (95% CI: 3.9–4.7), ranging from 8.9% in Romania and 8.8% in Bulgaria to 1% in Hungary. Frequent exposure to e-cigarette advertising was reported by 6.8% (95% CI: 6.3–7.4) of all respondents, with the United Kingdom (21.6%; 95% CI: 18.9–24.5) and Ireland (14.1%; 95% CI: 12.3–16.3) having the highest prevalence of frequent exposure. Frequent exposure to advertising of HTPs was reported by 3.6% (95% CI: 3.2–4.0) of all respondents. The highest prevalence of frequent exposure to HTP advertising was in the United Kingdom (8.2%; 95% CI: 6.4–10.3). Any exposure to advertising of smoking tobacco, e-cigarettes and HTPs was 34.6% (95% CI: 33.7–35.6), 39.3% (95% CI: 38.4–40.4) and 28.2% (95% CI: 27.4–29.2), respectively.

The most prominent source of exposure to advertising of smoking tobacco products was at points of sale (46.2%), followed by public spaces (36.4%), and online (33.1%). Similarly, exposure to e-cigarette and HTP advertisements were also reported more frequently at the points of sale (46.6%), followed by online exposure (39.4%), and in public places (31.8%) (Table 2).

Table 3 provides an overview of the sociodemographic factors associated with frequent exposure to advertising of tobacco and nicotine products. Higher exposure was reported by those aged 15–24 years for smoking tobacco

Figure 1. Sources of exposure to advertising of smoking tobacco, e-cigarettes and heated tobacco products among those who reported any exposure, in 28 European countries, 2020



Online includes social networks or blogs, retailers' websites, other websites, and through mobile phone applications. Public places include billboards, posters or other types of advertising in public spaces, railway stations or airports and inflight magazines. TV/movies include TV shows or movies and in cinemas. Events and other promotions include events sponsored or organised by the tobacco/e-cigarette companies, through sales of other products, through free distribution or distribution of promotional items and around cafes or bars.

products (AOR=1.35; 95% CI: 1.22–1.49), e-cigarettes (AOR=1.88; 95% CI: 1.70–2.07), and HTPs (AOR=1.92; 95% CI: 1.73–2.13). While only current smoking status was associated with higher odds of frequently noticing smoking tobacco advertisements, both current and former smokers were more likely to have noticed e-cigarette and HTP advertising. Daily internet use was significantly associated with exposure to advertising of smoking tobacco products (AOR=2.28; 95% CI: 2.03–2.56), e-cigarettes (AOR 2.74; 95% CI: 2.41–3.11), and HTPs (AOR 2.88; 95% CI: 2.51–3.31). Higher level of education, male gender and urban residence were also significantly associated with increased exposure to advertising.

Respondents that were aged 15–24 years were more likely to be exposed to tobacco advertising online (AOR=3.17; 95% CI: 2.69–3.73), in public spaces (AOR=1.21; 95% CI: 1.02–1.43) and during promotional events (AOR=1.37; 95% CI: 1.16–1.61) compared to older respondents (Table

Table 1. Exposure to advertising of tobacco and nicotine products in 28 European countries, 2020

Countries	Smoking tobacco		E-cigarettes		Heated tobacco products	
	Frequent exposure	Any exposure	Frequent exposure	Any exposure	Frequent exposure	Any exposure
	Weighted % (95% CI)	Weighted % (95% CI)	Weighted % (95% CI)	Weighted % (95% CI)	Weighted % (95% CI)	Weighted % (95% CI)
Austria	4.9 (3.6–6.6)	28.4 (25.6–31.5)	3.5 (2.4–5.2)	26.7 (23.9–29.7)	2.7 (1.9–4.0)	21.2 (18.7–23.9)
Belgium	4.5 (3.2–6.2)	47.4 (43.6–51.1)	4.6 (3.2–6.7)	50.7 (46.9–54.4)	1.8 (1.0–3.0)	32.9 (29.5–36.6)
Bulgaria	8.8 (7.2–10.6)	45.1 (42.1–48.2)	5.4 (4.2–7.0)	32.4 (29.7–35.3)	6.8 (5.4–8.5)	37.6 (34.7–40.6)
Croatia	2.6 (1.8–3.7)	29.5 (26.7–32.5)	0.9 (0.5–1.7)	27.9 (25.2–30.8)	0.7 (0.4–1.4)	27.5 (24.8–30.4)
Cyprus	4.5 (2.7–7.4)	21.8 (17.9–26.4)	5.3 (3.3–8.3)	25.1 (21.0–29.8)	4.5 (2.7–7.4)	21.4 (17.5–25.9)
Czech Republic	5.4 (4.0–7.1)	39.1 (35.9–42.5)	4.1 (3.0–5.5)	36.5 (33.3–39.9)	5.5 (4.2–7.2)	35.3 (32.1–38.6)
Denmark	1.7 (1.0–3.0)	19.2 (16.6–22.1)	1.8 (1.1–2.9)	26.2 (23.1–29.4)	0.5 (0.2–1.5)	12.0 (9.9–14.6)
Estonia	1.7 (1.0–2.7)	34.7 (31.5–38.1)	2.6 (1.8–3.9)	47.4 (43.9–50.9)	1.9 (1.2–3.0)	27.0 (24.1–30.2)
Finland	4.6 (0.9–20.4)	32.4 (26.5–39.0)	0.7 (0.4–1.3)	35.8 (29.2–43.1)	1.3 (0.8–2.1)	29.8 (23.0–37.8)
France	2.0 (1.3–3.1)	14.8 (12.4–17.5)	4.2 (3.1–5.7)	26.3 (23.4–29.4)	0.6 (0.3–1.4)	9.0 (7.2–11.3)
Germany	7.8 (6.4–9.4)	48.5 (45.8–51.2)	6.8 (5.6–8.2)	41.6 (38.9–44.3)	4.0 (3.1–5.2)	30.8 (28.4–33.4)
Greece	3.0 (2.1–4.2)	21.9 (19.4–24.6)	3.8 (2.8–5.2)	28.2 (25.4–31.1)	4.7 (3.6–6.2)	32.8 (29.9–35.9)
Hungary	1.0 (0.5–2.1)	8.3 (6.7–10.3)	1.2 (0.7–2.1)	10.0 (8.2–12.1)	0.7 (0.3–1.5)	7.7 (6.1–9.8)
Ireland	5.1 (4.0–6.7)	47.0 (44.1–49.9)	14.1 (12.3–16.3)	71.6 (68.9–74.2)	6.7 (5.4–8.4)	45.2 (42.3–48.2)
Italy	2.6 (1.8–3.8)	22.6 (20.1–25.4)	3.6 (2.6–5.0)	27.0 (24.3–29.9)	3.4 (2.4–4.7)	25.3 (22.7–28.1)
Latvia	5.1 (3.8–6.9)	26.8 (23.9–29.9)	4.8 (3.5–6.6)	24.5 (21.6–27.6)	5.7 (4.2–7.5)	21.1 (18.4–24.1)
Lithuania	1.8 (1.0 – 3.0)	10.8 (8.8–13.2)	1.2 (0.6–2.4)	12.6 (10.4–15.2)	1.5 (0.8–2.7)	10.4 (8.3–12.9)
Luxembourg	5.5 (3.6–8.4)	52.5 (47.7–57.2)	4.7 (3.0–7.3)	46.2 (41.5–51.0)	2.7 (1.3–5.3)	33.6 (29.1–38.4)
Malta	1.1 (0.3–3.3)	13.8 (10.3–18.1)	1.0 (0.3–3.7)	12.7 (9.3–17.2)	0.1 (0.0–0.7)	7.7 (5.1–11.4)
Netherlands	2.5 (1.6–3.8)	33.6 (29.7–37.7)	1.7 (1.0–3.0)	38.1 (34.1–42.3)	0.9 (0.4–2.1)	20.6 (17.2–24.4)
Poland	2.4 (1.6–3.6)	27.6 (24.8–30.5)	6.2 (4.8–8.0)	28.2 (25.4–31.2)	1.1 (0.6–2.0)	24.6 (21.9–27.5)
Portugal	4.0 (3.0–5.5)	16.7 (14.5–19.1)	3.6 (2.6–5.0)	22.0 (19.6–24.7)	4.2 (3.1–5.7)	23.8 (21.3–26.6)
Romania	8.9 (7.3–10.7)	43.6 (40.7–46.6)	4.9 (3.8–6.4)	37.2 (34.3–40.1)	6.2 (4.9–7.8)	37.6 (34.8–40.6)
Slovakia	4.8 (3.6–6.4)	37.3 (34.2–40.5)	3.7 (2.6–5.1)	34.9 (31.8–38.1)	4.2 (3.1–5.9)	33.7 (30.7–36.9)
Slovenia	3.2 (2.2–4.6)	19.6 (17.1–22.4)	2.4 (1.6–3.7)	19.0 (16.5–21.7)	1.9 (1.2–3.1)	17.3 (14.9–20.0)
Spain	6.1 (4.7–7.8)	45.1 (41.7–48.5)	6.0 (4.7–7.7)	47.2 (43.8–50.6)	3.9 (2.8–5.3)	30.8 (27.8–33.9)
Sweden	4.1 (2.9–5.7)	50.4 (47.0–53.7)	1.7 (1.0–2.9)	42.4 (39.1–45.7)	0.6 (0.3–1.5)	27.4 (24.5–30.5)
United Kingdom	2.9 (1.9–4.3)	47.8 (44.2–51.3)	21.6 (18.9–24.5)	76.5 (73.2–79.5)	8.2 (6.4–10.3)	48.8 (45.2–52.3)
Total	4.3 (3.9–4.7)	34.6 (33.7–35.6)	6.8 (6.3–7.4)	39.3 (38.4–40.4)	3.6 (3.2–4.0)	28.2 (27.4–29.2)

Table 2. Sociodemographic factors associated with any exposure to advertising of tobacco and nicotine products in 28 European countries, 2020 (N=28033)

Variables	Smoking tobacco AOR (95% CI)	E-cigarettes AOR (95% CI)	Heated tobacco products AOR (95% CI)
Age (years)			
≥55 ®	1.00	1.00	1.00
40–54	1.05 (0.98–1.13)	1.30 (1.21–1.39)	1.31 (1.22–1.42)
25–39	1.05 (0.97–1.13)	1.39 (1.29–1.50)	1.49 (1.38–1.62)
15–24	1.35 (1.22–1.49)	1.88 (1.70–2.07)	1.92 (1.73–2.13)
Sex			
Female ®	1.00	1.00	1.00
Male	1.22 (1.16–1.29)	1.25 (1.18–1.32)	1.27 (1.20–1.34)
Difficulty paying bills			
Never/almost never ®	1.00	1.00	1.00
From time to time/most of the time	1.09 (1.02–1.16)	1.06 (0.99–1.13)	1.12 (1.05–1.20)
Education level			
Lower secondary or lower ®	1.00	1.00	1.00
Upper secondary	1.18 (1.09–1.27)	1.18 (1.09–1.28)	1.14 (1.04–1.24)
Tertiary up to Bachelor's	1.32 (1.20–1.45)	1.37 (1.25–1.51)	1.26 (1.14–1.39)
Master's or higher	1.34 (1.21–1.48)	1.47 (1.33–1.62)	1.30 (1.16–1.44)
Residence			
Rural ®	1.00	1.00	1.00
Urban	1.20 (1.13–1.27)	1.19 (1.12–1.27)	1.24 (1.16–1.32)
Smoking status			
Never smoker ®	1.00	1.00	1.00
Current smoker	1.21 (1.13–1.29)	1.39 (1.30–1.49)	1.50 (1.39–1.61)
Former smoker	1.02 (0.95–1.09)	1.26 (1.18–1.35)	1.22 (1.14–1.32)
Internet use			
Never ®	1.00	1.00	1.00
Less than daily	2.06 (1.78–2.39)	2.04 (1.74–2.40)	2.17 (1.83–2.57)
Daily	2.28 (2.03–2.56)	2.74 (2.41–3.11)	2.88 (2.51–3.31)

AOR: adjusted odds ratio, from multilevel logistic regression models. Exposure to advertising reported as 'rarely', 'from time to time' or 'often' in the past 12 months. ® Reference categories.

4). Exposure online and within promotional events was also more frequently reported by males, respondents with financial difficulties, and those who use the internet daily. Exposure to POS advertising was more likely among both current and former smokers.

Similarly, respondents 15–24 years were more likely to be exposed to e-cigarette/HTP advertising online (AOR=3.29; 95% CI: 2.83–3.82), in public spaces (AOR=1.60; 95% CI: 1.36–1.89), and during promotional events (AOR=1.27; 95% CI: 1.08–1.49). We found no differences by smoking status, with the exception of exposure to e-cigarette or HTP advertising at the POS, in which former smokers were more likely to report exposure. Exposure to online advertisements for e-cigarettes or HTPs was more likely among males, those

Table 3. Sociodemographic factors associated with sources of exposure to advertising of smoking tobacco in 28 European countries, 2020 (N=9038)

Variables	Newspapers, magazines AOR (95% CI)	Online AOR (95% CI)	Public spaces AOR (95% CI)	Sales points AOR (95% CI)	TV, movies AOR (95% CI)	Events, promotions AOR (95% CI)
Age (years)						
≥55 ®	1.00	1.00	1.00	1.00	1.00	1.00
40–54	0.80 (0.70–0.92)	1.59 (1.41–1.80)	1.03 (0.91–1.17)	1.09 (0.98–1.23)	0.79 (0.68–0.92)	1.18 (1.04–1.33)
25–39	0.69 (0.59–0.80)	2.33 (2.05–2.65)	1.13 (0.99–1.29)	0.91 (0.80–1.03)	0.96 (0.82–1.13)	1.26 (1.10–1.43)
15–24	0.52 (0.42–0.64)	3.17 (2.69–3.73)	1.21 (1.02–1.43)	0.87 (0.74–1.02)	1.13 (0.93–1.38)	1.37 (1.16–1.61)
Sex						
Female ®	1.00	1.00	1.00	1.00	1.00	1.00
Male	0.94 (0.85–1.05)	1.10 (1.01–1.21)	1.06 (0.97–1.17)	1.05 (0.96–1.14)	1.08 (0.96–1.21)	1.22 (1.11–1.34)
Difficulty paying bills						
Never/almost never ®	1.00	1.00	1.00	1.00	1.00	1.00
From time to time/most of the time	1.09 (0.96–1.25)	1.27 (1.14–1.42)	0.94 (0.84–1.06)	0.83 (0.75–0.92)	1.22 (1.07–1.41)	1.20 (1.08–1.34)
Education level						
Lower secondary or lower ®	1.00	1.00	1.00	1.00	1.00	1.00
Upper secondary	0.89 (0.75–1.04)	1.06 (0.92–1.22)	1.18 (1.02–1.37)	0.92 (0.81–1.06)	0.98 (0.82–1.17)	0.98 (0.85–1.13)
Tertiary up to Bachelor's	0.99 (0.82–1.20)	1.17 (0.99–1.38)	1.25 (1.06–1.48)	1.07 (0.91–1.24)	1.14 (0.94–1.39)	1.10 (0.93–1.29)
Master's or higher	0.98 (0.81–1.20)	1.02 (0.86–1.22)	1.28 (1.07–1.53)	1.13 (0.96–1.33)	1.10 (0.89–1.36)	1.00 (0.84–1.19)
Residence						
Rural ®	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.87 (0.77–0.98)	1.07 (0.97–1.18)	1.17 (1.05–1.30)	1.21 (1.1–1.33)	1.06 (0.93–1.20)	1.23 (1.11–1.36)
Smoking status						
Current smoker ®	1.00	1.00	1.00	1.00	1.00	1.00
Former smoker	0.72 (0.62–0.83)	0.96 (0.85–1.07)	0.78 (0.69–0.89)	1.41 (1.26–1.57)	0.88 (0.75–1.02)	0.98 (0.87–1.10)
Never smoker	0.87 (0.76–0.99)	1.01 (0.90–1.14)	0.90 (0.80–1.02)	1.13 (1.01–1.26)	1.01 (0.88–1.16)	1.08 (0.96–1.21)
Internet use						
Never ®	1.00	1.00	1.00	1.00	1.00	1.00
Less than daily	1.18 (0.86–1.63)	4.64 (3.10–6.94)	1.45 (1.06–1.97)	0.82 (0.63–1.07)	1.39 (0.95–2.03)	1.38 (1.04–1.82)
Daily	1.16 (0.89–1.51)	5.43 (3.78–7.81)	1.59 (1.23–2.05)	1.00 (0.81–1.24)	1.33 (0.97–1.82)	1.43 (1.14–1.80)

AOR: adjusted odds ratio, from multilevel logistic regression models. ® Reference categories.

Table 4. Sociodemographic factors associated with sources of exposure to advertising of e-cigarettes and/or heated tobacco products in 28 European countries, 2020 (N=10277)

Variables	Newspapers, magazines AOR (95% CI)	Online AOR (95% CI)	Public spaces AOR (95% CI)	Sales points AOR (95% CI)	TV, movies AOR (95% CI)	Events, promotions AOR (95% CI)
Age (years)						
≥55 ®	1.00	1.00	1.00	1.00	1.00	1.00
40–54	0.86 (0.75–0.98)	1.78 (1.60–2.00)	1.14 (1.00–1.29)	1.09 (0.98–1.22)	0.81 (0.69–0.96)	1.02 (0.9–1.15)
25–39	0.81 (0.70–0.94)	2.52 (2.24–2.83)	1.39 (1.22–1.59)	0.97 (0.86–1.09)	1.03 (0.87–1.22)	1.2 (1.06–1.37)
15–24	0.57 (0.47–0.69)	3.29 (2.83–3.82)	1.60 (1.36–1.89)	0.86 (0.74–1.00)	1.18 (0.96–1.45)	1.27 (1.08–1.49)

Continued

Table 4. Continued

Variables	Newspapers, magazines AOR (95% CI)	Online AOR (95% CI)	Public spaces AOR (95% CI)	Sales points AOR (95% CI)	TV, movies AOR (95% CI)	Events, promotions AOR (95% CI)
Sex						
Female ®	1.00	1.00	1.00	1.00	1.00	1.00
Male	1.04 (0.94–1.16)	1.18 (1.08–1.28)	1.02 (0.93–1.12)	1.05 (0.97–1.14)	1.06 (0.94–1.2)	1.05 (0.96–1.15)
Difficulty paying bills						
Never/almost never ®	1.00	1.00	1.00	1.00	1.00	1.00
From time to time/most of the time	1.10 (0.97–1.25)	1.30 (1.17–1.43)	0.87 (0.78–0.98)	0.85 (0.77–0.94)	1.24 (1.07–1.43)	1.24 (1.11–1.37)
Education level						
Lower secondary or lower ®	1.00	1.00	1.00	1.00	1.00	1.00
Upper secondary	0.98 (0.84–1.15)	1.10 (0.96–1.25)	1.14 (0.98–1.31)	1.07 (0.94–1.22)	0.74 (0.62–0.88)	1.03 (0.9–1.18)
Tertiary up to Bachelor's	1.02 (0.86–1.22)	1.04 (0.90–1.20)	1.23 (1.04–1.45)	1.13 (0.98–1.3)	0.81 (0.66–0.99)	1.06 (0.91–1.24)
Master's or higher	1.06 (0.88–1.28)	0.96 (0.82–1.13)	1.33 (1.12–1.58)	1.25 (1.07–1.46)	0.78 (0.63–0.97)	0.93 (0.78–1.1)
Residence						
Rural ®	1.00	1.00	1.00	1.00	1.00	1.00
Urban	0.92 (0.82–1.03)	1.11 (1.01–1.22)	1.22 (1.09–1.36)	1.16 (1.06–1.27)	1.1 (0.96–1.26)	1.1 (1–1.22)
Smoking status						
Current smoker ®	1.00	1.00	1.00	1.00	1.00	1.00
Former smoker	0.72 (0.63–0.82)	1.05 (0.95–1.17)	0.87 (0.77–0.99)	1.5 (1.35–1.66)	0.77 (0.65–0.9)	1.07 (0.96–1.2)
Never smoker	0.85 (0.75–0.97)	1.03 (0.92–1.14)	0.97 (0.86–1.09)	1.11 (1–1.23)	0.86 (0.74–1)	1.01 (0.9–1.13)
Internet use						
Never ®	1.00	1.00	1.00	1.00	1.00	1.00
Less than daily	1.03 (0.72–1.47)	3.01 (1.97–4.58)	1.18 (0.83–1.68)	0.81 (0.61–1.08)	1.08 (0.7–1.66)	1.59 (1.17–2.14)
Daily	0.91 (0.68–1.21)	4.08 (2.81–5.94)	1.18 (0.88–1.59)	1.02 (0.81–1.28)	1.12 (0.79–1.59)	1.43 (1.11–1.83)

AOR: adjusted odds ratio, from multilevel logistic regression models. ® Reference categories.

that face financial difficulties, urban dwellers and those who use the internet daily (Table 5).

DISCUSSION

Our analyses indicate broad cross-country differences in exposure to advertising of smoking tobacco, e-cigarettes and HTPs, and highlight sociodemographic characteristics associated with specific exposure routes of advertising in Europe. Our results are in concurrence with previous data from the 2014 Eurobarometer survey (November–December 2014), indicating that both tobacco product and e-cigarette advertisements were more likely to be seen by current smokers, males, younger respondents, those with financial difficulties, people who had tried e-cigarettes and daily internet users[25], while secondary analyses data from the subsequent 2017 wave of the Special Eurobarometer on Tobacco survey reported that 47% of Europeans had seen an advertisement for e-cigarettes or similar products[26]. Moreover, it is interesting to note that HTP product use has been previously reported in other population-based European studies to be more likely among youth, males, former and current smokers and current e-cigarette users[1], population characteristics that we also noted to be associated to be more likely to report exposure to e-cigarette or HTP advertising.

Overall, we noted a generally low percentage of frequent exposure to advertising across Europe. This potentially may be due to the fact that there are bans in advertising and promotion in most countries[27,28]. However, a substantial percentage was exposed to some advertising even in countries with comprehensive bans, which means that legislation may not be fully effective.

Although tobacco promotions at POS are directly associated with smoking, on the contrary POS bans are an effective way of reducing exposure to tobacco product advertising[29] and can impact youth exposure to tobacco product advertising[30,31], as well as regular smoking among youth and adults[32,33]. Our results indicate that in 2020, POS advertising still remained a significant source of exposure in Europe both for cigarettes/roll-your-own tobacco and for e-cigarettes/HTPs.

An additional area of concern, due to the difficulty in regulating content coming from third countries outside Europe, is online advertising, which was reported by more than a third of respondents. Engagement with online advertising of tobacco products has been noted to increase among adolescent populations in the US and may pose a threat, especially to susceptible youth[34]. Online presence seems to be a key marketing tool for e-cigarettes and HTPs[35,36]. They moreover are difficult to regulate considering the global rich and the overt promotion through influencers and sponsorships[37].

Strengths and limitations

This secondary data analysis provides a more recent assessment of the extent of nicotine containing product advertising across 28 European countries, with the use of large representative samples which allow for analyses to explore several sociodemographic factors and also provide results that are generalizable at the European level. Despite the above, due to the cross-sectional nature of the Eurobarometer, causal associations cannot be assessed, and only associations may be inferred. Furthermore, temporal associations across the three most recent Eurobarometer datasets were not performed due to the slightly different methodology and questions added to the 2020 Eurobarometer, which was modified due to the COVID-19 pandemic and the introduction of HTPs into the EU market. However, as the identified associations are very similar across time, it is possible to indicate traits of the European population more exposed – or more receptive – to exposure to product advertising. Moreover, as the Eurobarometer questionnaire asked a subset of those exposed to e-cigarettes/HTPs to report sources, it may not fully reflect the sources of exposure at the population level.

CONCLUSIONS

Our findings indicate the extent of the European population's exposure to tobacco, e-cigarette, and HTP advertising in 2020, and highlight both the routes and specific sociodemographic determinants of exposure. However, we noted substantial cross-country variations, which can be largely explained by different regulatory environments. Variation was greater in e-cigarettes/HTPs, potentially as these are not necessarily covered by older tobacco advertising bans and countries have adopted different approaches. The current findings provide an evidence base that may stimulate discussions related to potential revisions of the European TAD, which was last updated in 2003 and does not currently reflect the tobacco product landscape in 2024.

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CONFLICTS OF INTEREST
The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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Ethical approval and informed consent were not required for this study.

DATA AVAILABILITY
All analyses reported in this work are based on Eurobarometer data which are available free to the public (https://www.gesis.org/en/eurobarometer-data-service/search-data-access/data-access), and on data given in the Supplementary online file.

AUTHORS' CONTRIBUTIONS
All authors: study conception, interpretation of results, and revision of the manuscript for intellectual content. FF: cleaning of the data and analyses. HA: writing of the first draft and final version of the manuscript. All authors read and approved the final version of the manuscript.

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