



## Early View

Research letter

# Increased smoking and e-cigarette use among Irish teenagers: A new threat to Tobacco Free Ireland 2025

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## **TITLE Page:**

### **Increased smoking and e-cigarette use among Irish teenagers: A new threat to Tobacco Free Ireland 2025.**

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## **Introduction**

*Tobacco Free Ireland* is an Irish Government policy which demands that the prevalence of tobacco smoking in Ireland be less than 5% by 2025. From 1995 to 2015, teen smoking decreased from 41% in 1995 to 13.1 % in 2015, and SimSmoke modelling suggested that the 5% 2025 target was achievable in that group (1). But, in 2019, current smoking (smoked in the past 30 days) increased overall from 13.1% in 2015 to 14.4% in 2019, with the increase being greater in boys than girls (16.2%) vs (12.8% ) (2). This threatens the Tobacco Free Ireland endgame and we drew on data from two waves (2015 and 2019) of the Irish ESPAD (European School Survey Project on Alcohol and other Drugs) to analyse the use of tobacco products by teenagers and offer an explanation for the change.

## **Sample**

ESPAD is a cross-sectional survey conducted every four years in 35 European countries, including Ireland, on substance use among students aged 15–16 years. We report on 2 waves

of Irish data (2015, 2019). Stratified random sampling was used to select fifty representative schools from a total of 712 post-primary schools, stratified according to school type, location, gender, religious affiliation, and school-level disadvantage status. Within these, simple random sampling of students born in 1999 (2015 data) and 2003 (2019 data) was carried out, yielding 1,493 students in 2015 and 1,949 students in 2019. Full descriptions of sampling, ethical approval, data collection procedures, as well as the data cleaning rules, are reported in the ESPAD Reports (3,4).

## **Measures**

Current smoking was measured by the question: ‘How often have you smoked cigarettes (excluding *e-cigarettes*) during the last 30 days?’: not at all; less than 1 cigarette per week; less than 1 cigarette per day; 1–5 cigarettes per day; 6–10 cigarettes per day; 11–20 cigarettes per day; and more than 20 cigarettes per day. Respondents were defined as *current smokers* if they had smoked at least once in the last 30 days.

Students were asked about their use of e-cigarettes (*ever-use* recoded never vs ever; *current-use* recoded no vs yes). Sociodemographic variables included gender, father’s and mother’s education, perceived family wealth, and household composition. Variables in the model also included other factors associated with smoking such as truancy (skipping school), access to cigarettes, perceived risk of smoking cigarettes occasionally or regularly (1 or more packs a day), and peer smoking, as well as familial regulation and maternal relationship.

## **Statistical analysis**

Descriptive statistics were used to show differences in sample characteristics from the two waves of the survey (2015 and 2019). Adjusted incidence risk ratios (IRR, 95% confidence intervals (CI)) for current smoking were estimated using a Poisson regression analysis and are shown for all respondents and, separately, by gender, with p-value of less than 0.05 considered

statistically significant. All statistical analysis was conducted using STATA version 16, presented in Table 1.

### **Results (Table 1)**

Analyses of sample characteristics show that, between 2015 and 2019, *e-cigarette ever-use* increased significantly from 23% (n=325) to 37.2% (n=723) ( $p<0.001$ ), and *e-cigarette current-use* increased significantly from 10.1% (n=143) to 18.1% (n=351) ( $p<0.001$ ). As well as a significant rise in *e-cigarette use*, other significant ( $p<0.05$ ) differences between 2015 and 2019 (the two survey waves) were that, in 2019, respondents perceived increased difficulty in accessing cigarettes and increased family wealth, and reported increased parental education.

Sample characteristics that did not change significantly between 2015 and 2019 were perceived risk from occasional or regular smoking, peer smoking, truancy, household composition, familial regulation, and relationship with mother. Students who had *ever-used e-cigarettes* were significantly more likely to be *current smokers* and this risk was more pronounced for boys (IRR 1.33, 95% CI: 1.17, 1.51) than for girls (IRR 1.27, 95% CI: 1.11, 1.45). Similarly, *current-use of e-cigarettes* was significantly associated with increased risk of *current smoking* for both girls and boys and the risk was much higher for girls (IRR 1.49, 95% CI: 1.26, 1.75) than for boys (IRR 1.39, 95% CI: 1.21, 1.60).

Students from two-parent and blended families were less likely to be *current smokers* than those from single-parent families (IRR 0.90, 95% CI: 0.83, 0.98 and IRR 0.84, 95% CI: 0.71, 0.99 respectively), significantly so for male students in two-parent families (IRR 0.88, 95% CI: 0.78, 0.99).

Truancy was significantly associated with *current smoking*, with students who reported that they skipped 5 or more days of school being more likely to be current smokers (IRR 1.53, 95% CI: 1.32, 1.78). Again, the risk was more pronounced for boys (IRR 1.61, 95% CI: 1.33, 1.96) than for girls (IRR 1.46, 95% CI: 1.14, 1.86).

Students who reported that most/all of their friends smoked were more likely to be *current smokers* than were those who had no smoking friends (IRR 1.20, 95% CI:1.06, 1.35) and this was more pronounced for girls (IRR 1.33, 95% CI:1.13,1.57) than for boys (IRR 1.08, 95% CI:0.92, 1.28).

## **Discussion**

We examined the increase in *current smoking* in 15-16-year-olds in Ireland between 2015 and 2019 and found that it was associated with *e-cigarette use*, truancy, household composition, familial regulation, and peer smoking. Consistent with Perelman et al. (3) and previous Irish ESPAD findings (2,4), the risks of *current smoking* were higher among those who reported truancy and were higher still among boys who reported skipping school more than 5 times.

Household composition has previously been associated with current smoking (4,5), with students from two-parent families being less likely to smoke than those from single-parent families . We provide partial confirmation for these findings in relation to boys only, with boys from two-parent families and also from blended families being significantly less likely to report *current smoking* than boys from single-parent families. We confirm our previous findings showing an association between familial regulation and current smoking (4). We recommend therefore that smoking intervention and prevention programmes be cognisant of family structure as well as gender (6).

Having peers who smoke is positively associated with teenage *current cigarette smoking* (7, 8). The risks of smoking are higher for students who report that most or all their friends smoke than for those with no friends who smoke, and higher for girls than for boys. Liu and colleagues (in a meta-analysis of 75 longitudinal teen smoking studies), found that having friends who smoke doubles the risk that youth aged 10 to 19 years will smoke (9). Our findings highlight the importance of making adolescents aware of, and attentive to, the role that friends play in their smoking initiation (10).

In Ireland, successive policy and legislative initiatives have led to teenagers' access to cigarettes decreasing (6). Our previous studies showed the association between perceived access to cigarettes and *current cigarette smoking* among adolescents (1) and our current study shows that teenagers perceive access to cigarettes to have become more difficult.

The significant increase in cigarette smoking among teenagers in Ireland in 2019 suggests that further regulatory restrictions are needed to limit access by teenagers to tobacco products (10, 12). This could be done by increasing the age for purchase of cigarettes to 21 years of age as has been done elsewhere (13) and also by extending restriction on where smoking is allowed (10,14).

Our findings show a negative effect of *e-cigarette ever-use* on teenagers' likelihood of *current smoking*. When the model controlled for various factors associated with smoking, *e-cigarette ever-use* had an additional negative effect, increasing the risks of being a *current smoker* for both boys and girls. *E-cigarette current-use* also increased the risk for current smoking for both boys and girls. Our findings support the need for the extension of tobacco control legislation regarding minors to include e-cigarettes. This may be desirable to prevent exposure to second-hand aerosol (SHA) (11) but also because of the possible renormalisation of smoking (9).

## **Conclusion**

We saw an increase in current cigarette smoking associated with an increasing use of e-cigarettes. Other associated factors did not deteriorate between 2015 and 2019, and access to cigarettes was perceived to have become more difficult during that period. We suggest that our findings highlight the negative impact that increased youth *e-cigarette use* had on current teenage cigarette smoking. We further suggest that this increase in e-cigarette use by teens poses a threat to the *Tobacco Free Ireland* policy goal of a smoking prevalence less than 5% by 2025 (1).

## **Author contribution**

Salome Sunday did the initial analysis and wrote the first version of the MS, Joan Hanafin and Luke Clancy conceptualized the structure, agreed the methodology and the content of the study. All authors contributed to the development of the MS and read and approved the final version. Luke Clancy acquired the funding and was responsible for resources and supervision.

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## **COI**

The authors declare that they have no conflict of interest

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**Table 1: Sample Characteristics, and Poisson regression results (Adjusted Incidence Risk Ratios - IRR) of factors associated with current smoking in 16-year-olds, based on data from the Irish 2015 & 2019 ESPAD Surveys**

	Sample Characteristics		Poisson Regression Results Current smoking (16-year-olds)		
	2015 n (%)	2019 n (%)	Total Adjusted IRR (95% CI)	Male Adjusted IRR (95% CI)	Female Adjusted IRR (95% CI)
<i>Year</i>					
2015	1472	---	1	1	1
2019	---	1947	0.91 (0.85, 0.98)*	0.91 (0.82, 1.00)	0.95 (0.86, 1.05)
<i>Gender</i>					
Male	752 (51.1)	946 (48.5)	1		
Female	720 (48.9)	1003 (51.4)	1.00 (0.93, 1.07)	N/A	N/A
<i>Ever-used e-cigarettes</i>					
No	1088 (77.0)	1219 (62.7)*	1	1	1
Yes	325 (23.0)	723 (37.2)	1.27 (1.16, 1.40)*	1.33 (1.17, 1.51)*	1.27 (1.11, 1.45)*
<i>Current use e-cigarettes</i>					
No	1270 (89.9)	918 (84.5)*	1	1	1
Yes	143 (10.1)	351 (18.1)	1.45 (1.31, 1.61)*	1.39 (1.21, 1.60)*	1.49 (1.26, 1.75)*
<i>Father's education</i>					
Primary/some sec	388 (30.0)	407 (21.5)*	1	1	1
Completed sec	273 (19.0)	345 (18.2)	0.94 (0.84, 1.05)	0.97 (0.84, 1.13)	0.92 (0.79, 1.08)
College/university	600 (41.7)	897 (47.4)	0.95 (0.87, 1.04)	1.00 (0.87, 1.15)	0.91 (0.80, 1.04)
Don't know/NA	177 (12.3)	244 (13.0)	0.99 (0.86, 1.15)	1.01 (0.81, 1.26)	1.01 (0.83, 1.23)
<i>Mother's education</i>					
Primary/some sec	212 (14.7)	215 (11.3)*	1	1	1
Completed sec	375 (26.1)	375 (19.7)	0.98 (0.87, 1.11)	1.01 (0.84, 1.21)	0.93 (0.79, 1.11)
College/university	719 (50.0)	1140 (60.0)	0.99 (0.89, 1.11)	0.98 (0.83, 1.16)	0.98 (0.84, 1.15)
Don't know/NA	132 (9.2)	169 (8.9)	0.92 (0.77, 1.10)	0.92 (0.71, 1.18)	0.92 (0.70, 1.21)
<i>Perceived wealth</i>					
About the same	696 (48.7)	815 (43.3)*	1	1	1
Much better off	223 (15.6)	308 (16.4)	1.09 (0.98, 1.20)	1.14 (0.99, 1.31)	1.04 (0.89, 1.21)
Better off	370 (25.9)	580 (30.8)	1.00 (0.91, 1.08)	1.00 (0.89, 1.13)	1.00 (0.88, 1.13)
Less well off	141 (9.9)	179 (9.5)	1.16 (1.04, 1.30)	1.17 (1.00, 1.37)	1.13 (0.96, 1.33)
<i>Household composition</i>					
Single parent	262 (17.8)	371 (19.0) *	1	1	1
Two parents	1109 (75.3)	1490 (76.4)	0.90 (0.83, 0.98)*	0.88 (0.78, 0.99)*	0.93 (0.82, 1.05)
Blended family	101 (6.9)	88 (4.5)	0.84 (0.71, 0.99)*	0.87 (0.68, 1.11)	0.81 (0.64, 1.03)
<i>Familial Regulation</i>					
Know always	906 (62.7)	1194 (63.2)	1	1	1
Know quite often	337 (23.3)	455 (24.1)	0.97 (0.89, 1.06)	0.97 (0.86, 1.09)	0.97 (0.86, 1.10)
Know sometimes	128 (8.9)	166 (8.8)	1.16 (1.04, 1.30)	1.15 (0.98, 1.34)	1.16 (0.98, 1.38)
Usually don't know	73 (5.1)	74 (3.9)	1.25 (1.07, 1.45)*	1.28 (1.06, 1.53)*	1.23 (0.92, 1.63)
<i>Relationship with mother</i>					
Satisfied	1251 (87.5)	1621 (86.4)	1	1	1
Neither nor	74 (5.2)	106 (5.6)	1.01 (0.87, 1.16)	0.95 (0.77, 1.18)	1.06 (0.87, 1.28)
Not satisfied	105 (7.3)	150 (8.0)	1.04 (0.92, 1.17)	0.99 (0.82, 1.18)	1.10 (0.93, 1.31)
<i>Skipping School</i>					
None	984 (80.1)	1309 (79.6)	1	1	1
1-4 days	198 (16.1)	286 (17.4)	1.17 (1.07, 1.27)*	1.17 (1.03, 1.32)*	1.16 (1.03, 1.32)*
5 days+	47 (3.8)	50 (3.0)	1.53 (1.32, 1.78)*	1.61 (1.33, 1.96)*	1.46 (1.14, 1.86)*
<i>Access to cigarettes</i>					
Difficult	348 (24.1)	551 (28.4)*	1	1	1
Easy	893 (61.8)	1188 (61.3)	1.07 (0.98, 1.18)	1.09 (0.95, 1.24)	1.06 (0.94, 1.20)
Do not know	205 (14.2)	200 (10.3)	0.93 (0.82, 1.07)	0.93 (0.77, 1.13)	0.94 (0.78, 1.14)
<i>Perceived risk occasional smoking</i>					

No/slight risk	602 (41.4)	777 (40.2)	1	1	1
Moderate/great risk	814 (56.0)	1097 (56.7)	1.00 (0.92, 1.07)	0.97 (0.87, 1.08)	1.02 (0.92, 1.14)
Do not know	37 (2.5)	61 (3.1)	1.22 (0.88, 1.70)	1.22 (0.73, 2.04)	1.21 (0.78, 1.88)
<i>Perceived risk regular smoking</i>					
No/slight risk	169 (11.6)	223 (11.5)	1	1	1
Moderate/great risk	1248 (85.8)	1655 (85.6)	1.00 (0.92, 1.07)	1.00 (0.86, 1.17)	0.96 (0.81, 1.15)
Do not know	37 (2.5)	56 (2.9)	1.22 (0.88, 1.70)	1.06 (0.63, 1.76)	0.92 (0.57, 1.51)
<i>Peer smoking</i>					
None	478 (33.4)	558 (29.8)	1	1	1
A few/some	802 (56.1)	1125 (60.1)	1.00 (0.92, 1.08)	0.99 (0.89, 1.11)	1.01 (0.90, 1.13)
Most/all	150 (10.5)	188 (10.1)	1.20 (1.06, 1.35)*	1.08 (0.92, 1.28)	1.33 (1.13, 1.57)*

\* statistical significance at  $p < .05$