

# Non-smokers' and smokers' support for smoke-free legislation in 14 indoor and outdoor settings across 12 European countries

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## ABSTRACT

**Background:** European countries differ considerably in the scope and the extent of their policies to protect people from the harms of secondhand smoke exposure. Public opinion may have a substantial influence on several stages of policy development, implementation, and compliance. For this reason, we aimed to evaluate the population level of support for smoke-free policies and its correlates.

**Methods:** We used data from the TackSHS Survey (2017-2018), a cross-sectional study with representative samples of the general population aged  $\geq 15$  years from 12 European countries. We described the proportion of non-smokers' and smokers' support for the implementation of smoke-free legislation in 14 indoor and outdoor settings and the country-level characteristics associated with it.

**Results:** In the total sample ( $n=11,902$ ), support for smoke-free legislation were the lowest for restaurants/bar patios (non-smokers=53.0%; smokers=29.2%) and the highest in workplaces (non-smokers=78.5%; smokers=66.5%). In the country-level analysis, the highest support among non-smokers was for workplaces in Bulgaria (93.1%) and the lowest for restaurants/bars patios in Greece (39.4%). Among smokers, the corresponding estimates were for children's playgrounds in Latvia (88.9%) and for cars in Portugal (21%). For most settings, support for smoke-free legislation was directly related with the countries' prevalence of secondhand smoke presence and reported smoking in each setting.

**Discussion:** Our results show that the majority of European adults (including a large proportion of smokers) are supportive of implementing smoke-free legislation in indoor settings and extending it to selected outdoor settings. Such expressive support can be seen as an opportunity to advance legislation and protect the European population from secondhand smoke exposure.

**Keywords:** Support, attitudes, smoke-free, Europe, smoking ban, second-hand smoke exposure

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## **ETHICAL APPROVAL**

The TackSHS project was approved by the Clinical Research Ethics Committee of the Bellvitge University Hospital (PR341/15), and the protocol of this study was approved by all the countries' local Research Ethics Committees.

## **1. INTRODUCTION**

Secondhand smoke (SHS) exposure is a known cause of disease among non-smokers, including lung cancer and cardiovascular disease in adults and asthma and sudden death syndrome in children (U.S. Department of Health and Human Services, 2006). According to the United States Centers for Disease Control and Prevention, there is no risk-free level of exposure to SHS as even brief exposures can be harmful (U.S. Department of Health and Human Services, 2006).

All European Union (EU) Member States are signatories of the World Health Organization Framework Convention on Tobacco Control (World Health Organization, 2003). and, consequently, most have implemented some sort of smoke-free legislation in their countries. However, countries differ considerably in the scope and the extent of policies to protect people from the harms of SHS exposure, both in indoor and outdoor settings (supplementary Table 1). Research shows that public opinion strongly impacts policy-making (Burstein, 2003). This is also true for the tobacco control field, in which public opinion has a substantial influence on policy design, implementation, compliance, and the behavioural changes related to such policies, being directly correlated to these outcomes (Gallus et al., 2006; Hyland et al., 2009; Nagelhout et al., 2012; Pacheco, 2012; Zhou et al., 2016). The tobacco industry seems to have recognised this effect and has taken action to influence attitudes in an attempt to resist tobacco control policies (Saloojee and Dagli, 2000).

Tobacco-control advocates and public health authorities look to minimise and ideally eradicate SHS exposure in public places. However, the efforts to have an extensive evaluation of public support for smoke-free legislation have been scarce in recent years in Europe, with the last Eurobarometer assessing this topic being released in 2009 (European Commission, 2009). Given the importance of public opinion in this matter, we aimed to evaluate the levels of

support for smoke-free legislation in different indoor and outdoor settings across 12 European countries, and examine the relationships between expressed support, SHS exposure and sociodemographic factors at country level.

## **2. METHODS**

### **2.1.Study Design**

We used data from the TackSHS Survey, a cross-sectional survey with representative samples of the general population from 12 European countries (Bulgaria, England, France, Germany, Greece, Ireland, Italy, Latvia, Poland, Portugal, Romania and Spain) (Fernández et al., 2020). Data were collected between June 2017 and October 2018. The samples comprised subjects aged 15 years old or older, representative of the general population in terms of age, sex, habitat (i.e., geographic area and/or size of municipality) and, in some countries, socio-economic characteristics. A total of 11,902 subjects were interviewed, around 1,000 per country, with 8,562 being non-smokers (never or ex-smokers) and 3,340 current smokers.

Sampling methods varied across countries, with respondents being recruited using multistage sampling (Bulgaria, Greece, Italy, Latvia, Poland, and Romania), cluster sampling with quotas (England and France), and stratified random sampling (Germany, Ireland, Portugal, and Spain). Interviews were conducted face-to-face with computer-assisted personal interviewing. The questionnaire contained four sections: socio-economic and demographic characteristics; smoking and e-cigarettes use; exposure to SHS and e-cigarettes aerosol in different settings; and attitudes and perceptions to smoke-free policies in different of indoor and outdoor settings. Further details about the methodology of the TackSHS survey are available elsewhere (Gallus et al., 2021).

Ethics approval was obtained from an ethics committee in each of the 12 countries. Additionally, the study protocol has been registered in ClinicalTrials.gov (ID: NCT02928536). All respondents provided their written consent to participate.

### **2.2.Measures**

### 2.2.1. Outcome measures

Outcomes were 14 indicators of support for smoke-free legislation in different indoor and outdoor settings. Participants were asked: “For each of the following sites, are you strongly in favour, moderately in favour, moderately against, or strongly against a total tobacco ban?” The indoor settings evaluated were restaurants and bars, discos/clubs/indoor arenas, train stations, workplaces, cars/private vehicles, cars/private vehicles with minors. The outdoor settings evaluated were restaurant/bar patios, stadia/outdoor arenas, tram/bus/subway stops, children’s playgrounds, and outdoor areas of schools, hospitals, parks, and beaches. Support for smoke-free legislation was asked for all settings in all countries, except for discos/clubs/indoor arenas in Germany and cars and cars with minors in England, due to logistic problems during data collection. For statistical analysis, all outcome indicators were dichotomised as *in favour* (‘strongly in favour’ and ‘moderately in favour’) vs *not in favour* (‘moderately against’ and ‘strongly against’).

### 2.2.2. Covariates

Sociodemographic characteristics studied were: country, sex (male/female), age (<25, 25–44, 45–64, 65 and older), education (tertiles of schooling years), self-assessed household economic status (higher than average, average, and lower than average), and smoking status, categorised as never smokers (never smoked or have smoked less than 100 cigarettes in their lifetime), ex-smokers (have smoked at least 100 cigarettes in their lifetime and have stopped smoking at the time of survey), and smokers (have smoked at least 100 cigarettes in their lifetime and were smoking by the time of survey).

We categorised the 12 countries by geographical regions according to the classification by the United Nations into Northern (England, Ireland, and Latvia), Western (France and Germany), Southern (Italy, Greece, Portugal, and Spain), and Eastern regions (Bulgaria, Poland, and Romania) (United Nations, n.d.); by their World Bank gross domestic product (GDP) *per*



*capita* into <25,000€ (Latvia, Romania, Poland, Portugal, Greece, and Bulgaria) and ≥25,000€ (England, France, Germany, Ireland, Italy, and Spain) (World Bank, n.d.); by their Tobacco Control Scale (TCS) score in 2016, score ≤50 (Bulgaria, Poland, Portugal, Latvia, Greece and Germany) and score >50 (England, Ireland, France, Romania, Italy and Spain) (Joossens and Raw, 2017); by their sociodemographic index (SDI) into high SDI (England, France, Germany, Greece, Ireland, Italy, Latvia, Poland, Spain) and middle-high SDI (Bulgaria, Portugal, Romania) (Global Burden of Disease Collaborative Network 2018), and by their smoking prevalence obtained from the TackSHS survey, <31% (Ireland, Italy and England, Germany, Latvia and Poland) and ≥31% (Bulgaria, France, Greece, Portugal, Romania and Spain) (Gallus et al., 2021).

SHS presence in outdoor settings was assessed with the following question asked to non-smokers: “In the last 6 months, were people smoking regular cigarettes the last time you visited the following sites?”. Current smokers reported smoking in outdoor setting was assessed with the following question asked to smokers: “In the last 6 months, did you smoke a regular cigarette the last time you visited the following sites?”. Response options for both questions were: “Yes”, “No” and “Never visited in the last 6 months”. The sites considered were patios of restaurants and bars, public transport stops, outdoor areas of hospitals, outdoor areas of schools, parks, children’s playgrounds, stadia, and beaches. Among participants who visited a place in the last 6 months, those non-smokers declaring to have seen people smoking regular cigarettes and those smokers declaring having smoked cigarettes in any of the above-mentioned settings accounted, respectively, for SHS presence and reported smoking in that setting (Henderson et al., 2021b).

### **2.3.Statistical analysis**

All statistical analyses were weighted to ensure the sample represented the general population in each of the 12 countries (individual weights). Estimates for the entire sample were made using “country weights”, combining individual weights with an additional weighting factor, each country contributing in proportion to its population aged 15 years or over (European Commission 2018). We report the frequencies (%) and 95% confidence intervals (CIs) of the outcome measures. For each outcome measure, we tested for differences between non-smokers’ and smokers’ percentages of support using chi square tests. Additionally, we evaluated the associations between support for smoke-free policies in diverse settings and different country-level characteristics and have computed odds ratios to test for the association between each country-level characteristic and support using multilevel logistic regression models after adjustment for sex, age, level of education, and smoking status (current and non-smokers) and with country as random effect to test for differences. Spearman’s correlation ( $r_{sp}$ ) was used to test the association between support for smoke-free policies, (1) SHS presence and (2) reported smoking in outdoor settings (Henderson et al., 2021b). All analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC, USA).

### 3. RESULTS

The sample sociodemographic characteristics are presented in online supplementary table 2.

#### 3.1.Support for smoke-free legislation in indoor settings

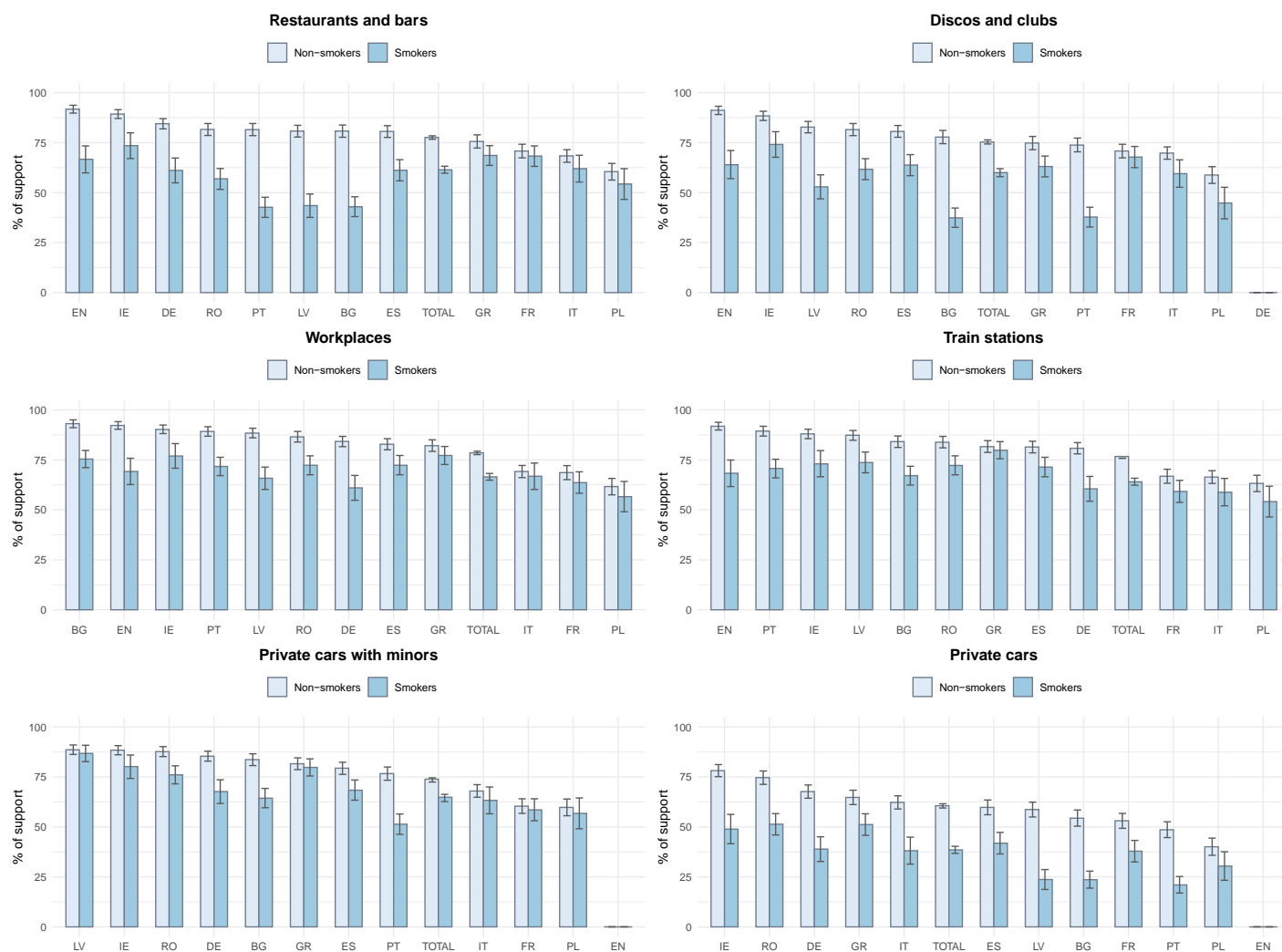
Figure 1 and supplementary Table 3 show the overall and country-specific support for tobacco-free legislation in indoor settings in 2017-2018. Supplementary tables 4 to 6 show the levels of support stratified by the four original response options ('strongly in favour', 'moderately in favour', 'moderately against' and 'strongly against'). Overall, the highest level of support among non-smokers was for workplaces (78.5%; 95% CI: 77.6-79.3) and the inside areas of restaurants and bars (77.6%; 95% CI: 76.7-78.4), while among smokers it was for workplaces (66.5%; 95% CI: 64.8-68.2) and train stations (64.0%; 95% CI: 62.3-65.8).

The point estimates of support for smoke-free legislation in indoor settings were higher among non-smokers than among smokers across all countries and settings, although a some of these differences were not significant (see supplementary table 3). More than 60% of non-smokers supported smoke-free legislation in all indoor settings in each of the countries, except for private cars and private cars with minors in Poland, in which support was 40.1% and 59.8% respectively. Non-smokers in Poland had the lowest support for all settings, while those in England declared the highest support for all settings in which data for the country was collected (Figure 1). Smokers in Ireland reported the highest support in 3 out of the 6 indoor setting evaluated while smokers in Portugal and Poland each presented the lowest support for 2 of the 6 settings.

Differences in support for smoke-free restaurants and bars between non-smokers and smokers in Portugal (81.5% vs 42.7%), Bulgaria (80.8% vs 42.9%) and Latvia (80.8% vs 43.5%) were very pronounced. Similarly, support for smoke-free discos and clubs between non-smokers and

smokers was very pronounced in Portugal (73.8% vs 37.8%), Bulgaria (77.8% vs 37.4%) and Latvia (82.8% vs 52.9%).

Figure 1. Non-smokers' and smokers' support for smoke-free legislation in diverse indoor settings in 12 European countries, the TackSHS Survey, 2017-2018.



Data on support for smoke-free legislation in discos and clubs in Germany and on cars and cars with minors in England were not collected.

For estimates of the total sample, country weights were applied, combining individual weights with an additional weighting factor, each country contributing in proportion to its population aged 15 years or over.

EN=England, IE=Ireland, DE=Germany, RO=Romania, PT=Portugal, LV=Latvia, BG=Bulgaria, ES=Spain, GR=Greece, FR=France, IT=Italy, PL=Poland, TOTAL=Total sample.

### **3.2.Support for smoke-free legislation in outdoor settings**

Figure 2 and supplementary Table 4 show overall and country-specific support for smoke-free legislation in outdoor settings in 2017-2018. Supplementary tables 7 to 9 show the levels of support stratified by the four original response options ('strongly in favour', 'moderately in favour', 'moderately against' and 'strongly against'). There were differences between non-smokers' and smokers' support, with non-smokers supporting smoke-free legislation significantly more than smokers across all countries and settings. The exceptions were the levels of support for children's playgrounds in Latvia and Poland, outdoor areas of schools and stadia in Poland in which there were no significant differences in the support between non-smokers and smokers. The overall support among non-smokers and smokers was the highest for children's playgrounds (73.8%; 95% CI: 72.9-74.7 and 61.7%; 95% CI: 60.0-63.5, respectively) and the lowest was for restaurants/bars patios (53.0%; 95% CI: 52.0-54.1 and 29.2%; 95% CI: 27.6-30.8, respectively).

Figure 2. Non-smokers' and smokers' support for smoke-free legislation in diverse outdoor settings in 12 European countries, the TackSHS Survey, 2017-2018.



For estimates of the total sample, country weights were applied, combining individual weights with an additional weighting factor, each country contributing in proportion to its population aged 15 years or over. EN=England, IE=Ireland, DE=Germany, RO=Romania, PT=Portugal, LV=Latvia, BG=Bulgaria, ES=Spain, GR=Greece, FR=France, IT=Italy, PL=Poland, TOTAL=Total sample.

### 3.3. Country-level factors associated with support for smoke-free legislation

Support for smoke-free legislation in indoor and outdoor settings according to different country-level characteristics is shown in Tables 1 and 2. Supplementary tables 11 and 12 show the regression model testing for differences in support in countries by the country-level characteristics.

The group of countries scoring above 50 in the TCS (i.e., countries with high tobacco control initiatives) had significantly higher support for smoke-free legislation in discos and clubs (74.3%; OR:2.07; 95% CI: 1.20-3.56) and parks (50.5%; OR:1.34; 95% CI: 1.06-1.70) as compared to those countries with lower level of tobacco control policies. Those countries with smoking prevalence <31% had significantly higher support for smoke-free legislation in outdoor settings when compared to those with higher smoking prevalence, although these differences were only significant for restaurants/bars patios (OR:1.57; 95% CI: 1.27-1.93) and tram/bus/subway stops (OR:1.39; 95% CI:1.05-1.84). . Countries in the Northern region had significantly higher support for smoke-free legislation across all indoor and outdoor settings, except for private cars, private cars with minors and restaurants/bars patios. Moreover, countries with higher GDP *per capita* had significantly higher support for smoke-free legislation in restaurants/bars (75.5%; OR:1.68; 95% CI: 1.02-2.77) and discos/clubs (74.3%; OR:1.79; 95% CI: 1.02-3.13) as compared to those with lower GDP *per capita*. The socio-demographic index differences were not significantly associated with higher support for any of the indoor or outdoor settings.

Table 1. Support for smoke-free legislation in diverse indoor settings according to country-level characteristics in 12 European countries, the TackSHS Survey, 2017-2018.



INDOORS						
	Restaurants/bars % (95% CI)	Discos/clubs % (95% CI)	Train stops/subway stops % (95% CI)	Workplaces % (95% CI)	Private cars % (95% CI)	Private cars with minors % (95% CI)
<b>Tobacco Control Scale score (2016)<sup>a</sup></b>						
>50 points	74.1 (73.1,75.2)	74.3 (73.3,75.3)	73.5 (72.4-74.5)	75.6 (74.6,76.6)	55.0 (53.7,56.3)	69.0 (67.8,70.2)
≤50 points	72.2 (70.8,73.5)	60.2 (58.0,62.4)	73.4 (72.0-74.7)	75.0 (73.7,76.3)	52.7 (51.2,54.2)	74.7 (73.4,76.0)
<b>Smoking prevalence (%)<sup>b</sup></b>						
<31 %	74.6 (73.6,75.7)	71.4 (70.1,72.8)	73.5 (72.5-74.5)	75.4 (74.4,76.4)	55.6 (54.3,56.9)	72.5 (71.3,73.7)
≥31 %	71.5 (70.2,72.8)	71.2 (69.9,72.5)	73.3 (72.0-74.6)	75.3 (74.1,76.6)	52.2 (50.7,53.6)	70.2 (68.9,71.6)
<b>Geographic area within Europe<sup>c</sup></b>						
Northern	86.3 (84.7,88.0)	85.5 (83.8,87.3)	86.9 (85.3-88.5)	87.5 (85.9,89.0)	65.2 (58.2,72.2)	87.2 (82.3,92.0)
Western	75.1 (73.8,76.3)	69.9 (67.8,72.0)	71.0 (69.6-72.3)	73.6 (72.3,75.0)	55.5 (54.0,57.0)	72.0 (70.6,73.3)
Southern	70.3 (68.8,71.7)	70.2 (68.7,71.6)	72.5 (71.1-73.9)	74.7 (73.3,76.1)	55.1 (53.5,56.7)	71.5 (70.0,72.9)
Eastern	64.1 (61.9,66.3)	62.2 (60.0,64.5)	68.7 (66.6-70.8)	69.8 (67.7,71.9)	47.4 (45.1,49.7)	68.7 (66.6,70.8)
<b>GDP per capita (€) 2018<sup>d</sup></b>						
>25,000 euros	75.5 (74.6,76.4)	74.3 (73.2,75.3)	73.7 (72.8-74.7)	76.0 (75.1,76.9)	56.0 (54.9,57.2)	71.8 (70.7,72.8)
≤25,000 euros	65.8 (63.9,67.6)	63.4 (61.5,65.3)	72.2 (70.5-74.0)	73.0 (71.2,74.7)	48.0 (46.0,49.9)	70.5 (68.7,72.3)
<b>Sociodemographic index (SDI) (2017)<sup>e</sup></b>						
High SDI	73.7 (72.9,74.6)	71.7 (70.7,72.7)	72.7 (71.9-73.6)	74.6 (73.8,75.4)	54.0 (53.0,55.1)	70.7 (69.8,71.7)
High-middle SDI	70.1 (67.3,72.8)	68.3 (65.5,71.1)	80.2 (77.8-82.6)	82.9 (80.6,85.1)	54.0 (51.0,57.0)	77.7 (75.2,80.2)

Country weights were applied, combining individual weights with an additional weighting factor, each country contributing in proportion to its population aged 15 years or over.

<sup>a</sup>Tobacco Control Scale 2016 score:(Joossens and Raw, 2017)  $\leq 50$  (Bulgaria, Poland, Portugal, Latvia, Greece and Germany) and score  $> 50$  (England, Ireland, France, Romania, Italy and Spain).

<sup>b</sup>Country's total smoking prevalence:(Gallus et al., 2021)  $< 30\%$  (Ireland, Italy and England, Germany, Latvia and Poland) and  $> 31\%$  (Bulgaria, France, Greece, Portugal, Romania and Spain).

<sup>c</sup>United Nations M49 Standard Geographical area:(United Nations, n.d.) Northern Europe (Ireland, Latvia and England), Western Europe (France and Germany), Southern Europe (Italy, Greece, Portugal and Spain) and Eastern Europe (Bulgaria, Poland and Romania).

<sup>d</sup>World Bank gross domestic product (GDP) per capita:(World Bank, n.d.) GDP per capita  $\leq 25,000\text{€}$  (Bulgaria, Latvia, Romania, Poland, Portugal and Greece) and GDP per capita  $> 25,000\text{€}$  (England, France, Germany, Ireland, Italy and Spain).

<sup>e</sup>Sociodemographic index (SDI):(Global Burden of Disease Collaborative Network., 2018) into High SDI (England, France, Germany, Greece, Ireland, Italy, Latvia, Poland, Spain) and middle-high SDI (Bulgaria, Portugal, Romania)

Table 2. Support for smoke-free legislation in diverse outdoor settings according to country-level characteristics in 12 European countries, the TackSHS Survey, 2017-2018.

Country weights were applied, combining individual weights with an additional weighting factor, each country contributing in proportion to its population aged 15 years or over.

OUTDOORS								
	Restaurants/bars patios % (95% CI)	Tram/bus/subway stops % (95% CI)	Outdoor areas of schools % (95% CI)	Parks % (95% CI)	Children's playgrounds % (95% CI)	Beaches % (95% CI)	Outdoor areas of hospitals % (95% CI)	Stadia % (95% CI)
<b>Tobacco Control Scale score (2016)<sup>a</sup></b>								
>50 points	47.9 (46.8,49.1)	51.0 (49.8,52.1)	65.6 (64.5,66.7)	50.5 (49.4,51.7)	70.0 (69.0,71.1)	49.6 (48.4,50.7)	56.9 (55.7,58.0)	52.5 (51.4,53.7)
≤50 points	44.9 (43.5,46.4)	47.0 (45.5,48.4)	64.9 (63.5,66.3)	43.4 (42.0,44.9)	71.8 (70.5,73.1)	44.6 (43.1,46.1)	51.6 (50.2,53.1)	44.1 (42.6,45.6)
<b>Smoking prevalence (%)<sup>b</sup></b>								
<31 %	52.0 (50.9,53.2)	53.5 (52.3,54.7)	67.8 (66.7,68.9)	49.2 (48.1,50.4)	73.3 (72.2,74.3)	49.7 (48.5,50.9)	56.4 (55.3,57.6)	50.4 (49.3,51.6)
≥31 %	38.9 (37.5,40.3)	43.4 (41.9,44.8)	61.6 (60.2,63.0)	45.8 (44.4,47.2)	66.7 (65.4,68.1)	44.6 (43.2,46.1)	52.6 (51.1,54.0)	47.7 (46.2,49.1)
<b>Geographic area within Europe<sup>c</sup></b>								
Northern	54.2 (51.8,56.6)	64.4 (62.1,66.6)	84.4 (82.7,86.1)	57.9 (55.6,60.3)	87.6 (86.1,89.2)	56.2 (53.8,58.6)	69.1 (66.9,71.3)	61.2 (58.8,63.5)
Western	43.1 (41.6,44.6)	44.3 (42.8,45.8)	59.5 (58.0,61.0)	42.0 (40.5,43.5)	66.1 (64.7,67.5)	44.0 (42.6,45.5)	47.8 (46.3,49.3)	41.2 (29.8,42.7)
Southern	48.5 (46.9,50.1)	48.4 (46.8,49.8)	61.9 (60.3,63.4)	48.5 (46.9,50.1)	67.1 (65.6,68.6)	46.2 (44.7,47.8)	55.4 (53.8,57.0)	49.8 (48.3,51.4)
Eastern	45.0 (42.7,47.3)	49.9 (47.6,52.2)	68.2 (66.0,70.3)	50.9 (48.6,53.2)	72.9 (70.8,74.9)	51.6 (49.2,53.9)	57.1 (54.8,59.3)	56.4 (54.1,58.6)
<b>GDP per capita (€) 2018<sup>d</sup></b>								
>25,000 euros	48.0 (47.0,49.0)	50.1 (49.1,51.1)	65.0 (64.0,66.0)	47.6 (46.6,48.7)	70.5 (69.6,71.4)	47.5 (46.4-48.5)	54.9 (53.9,56.0)	48.3 (47.3,49.3)
≤25,000 euros	42.5 (40.6,44.5)	47.2 (45.3,49.2)	66.7 (64.8,68.5)	48.7 (46.7,50.6)	71.3 (69.6,73.1)	48.6 (46.6-50.5)	54.8 (52.8,56.7)	53.1 (51.1,55.0)
<b>Socio-demographic index (SDI) (2017)<sup>e</sup></b>								
High SDI	47.6 (46.7,48.6)	49.8 (48.9,50.8)	64.5 (63.6,65.4)	47.4 (46.4,48.3)	69.8 (69.0,70.7)	47.8 (46.9,48.8)	54.3 (53.4,55.3)	49.1 (48.1,50.0)
High-middle SDI	38.8 (35.9,41.7)	45.8 (42.8,48.7)	73.8 (71.2,76.4)	52.4 (49.4,55.4)	78.9 (76.5,81.3)	46.3 (43.3,49.3)	60.4 (57.5,63.3)	51.9 (48.9,54.9)

<sup>a</sup>Tobacco Control Scale 2016 score:(Joossens and Raw, 2017)  $\leq 50$  (Bulgaria, Poland, Portugal, Latvia, Greece and Germany) and score  $> 50$  (England, Ireland, France, Romania, Italy and Spain).

<sup>b</sup>Country's total smoking prevalence:(Gallus et al., 2021)  $< 30\%$  (Ireland, Italy and England, Germany, Latvia and Poland) and  $> 31\%$  (Bulgaria, France, Greece, Portugal, Romania and Spain).

<sup>c</sup>United Nations M49 Standard Geographical area:(United Nations, n.d.) Northern Europe (Ireland, Latvia and England), Western Europe (France and Germany), Southern Europe (Italy, Greece, Portugal and Spain) and Eastern Europe (Bulgaria, Poland and Romania).

<sup>d</sup>World Bank gross domestic product (GDP) per capita:(World Bank, n.d.) GDP per capita  $\leq 25,000\text{€}$  (Bulgaria, Latvia, Romania, Poland, Portugal and Greece) and GDP per capita  $> 25,000\text{€}$  (England, France, Germany, Ireland, Italy and Spain).

<sup>e</sup>Sociodemographic index (SDI):(Global Burden of Disease Collaborative Network., 2018) into High SDI (England, France, Germany, Greece, Ireland, Italy, Latvia, Poland, Spain) and middle-high SDI (Bulgaria, Portugal, Romania)

### **Association between support for smoke-free legislation in outdoor settings, secondhand smoke presence and smoking behaviour**

We explored the association between support for outdoor smoke-free legislation among non-smokers and their report of SHS presence in each of the 12 European countries. A lower SHS presence was significantly associated with a higher support for smoke-free legislation in each of the countries ( $r_{sp}$  between -0.78 in Italy and -0.93 in Bulgaria), except for Latvia and Poland (Figure 3).

Additionally, we explored the association between smokers' support for smoke-free legislation in outdoor settings and their reported smoking in each of the 12 European countries. Similarly, a lower reported smoking was significantly associated with a higher support for smoke-free legislation in all countries (Figure 4).

Figure 3. Scatterplots of the correlation (Spearman's  $r_{sp}$  correlation and p-value) between non-smokers' support for smoke-free legislation in diverse outdoors settings and prevalence of secondhand smoke presence in 12 European countries – The TackSHS Survey, 2017-2018.

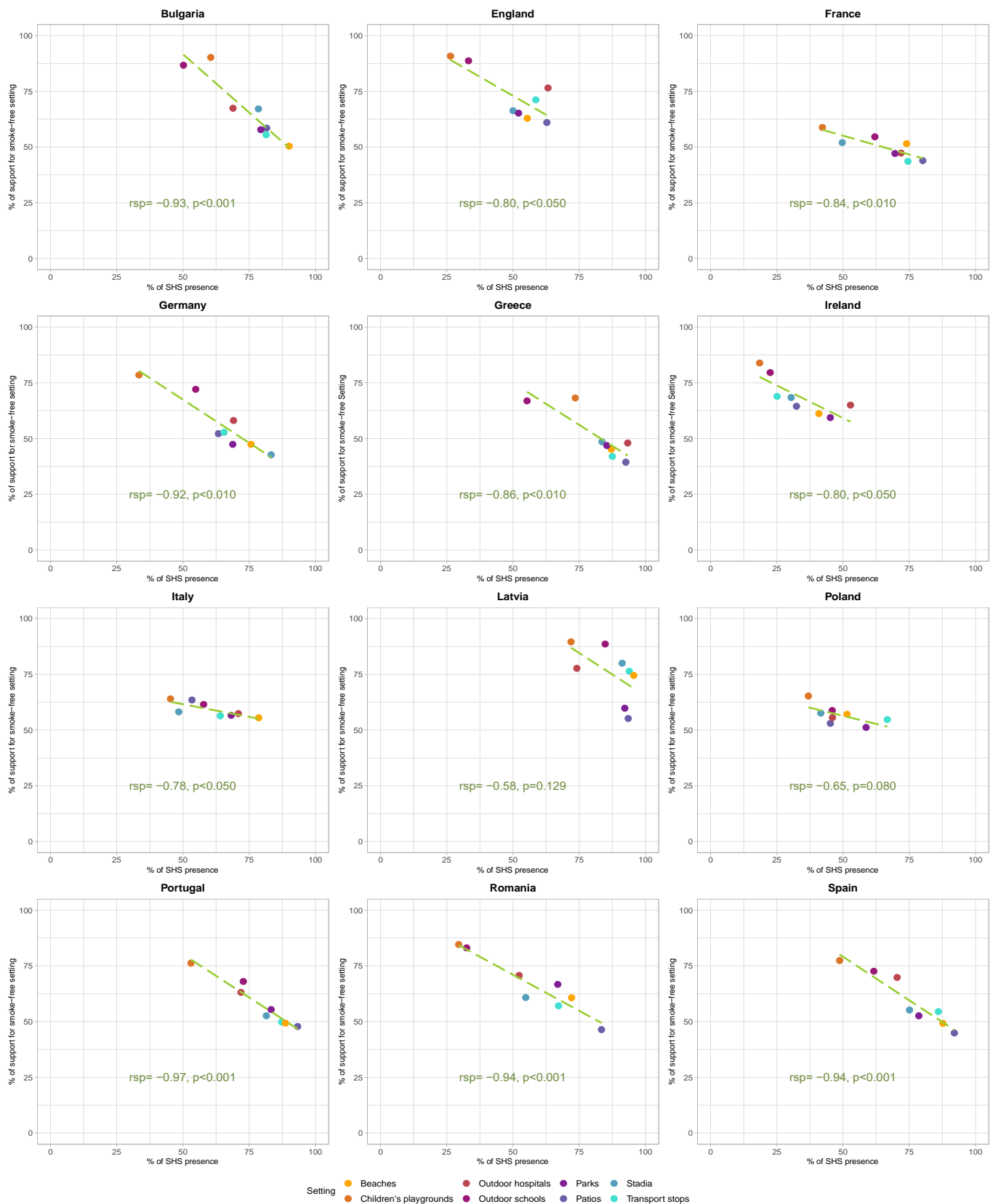
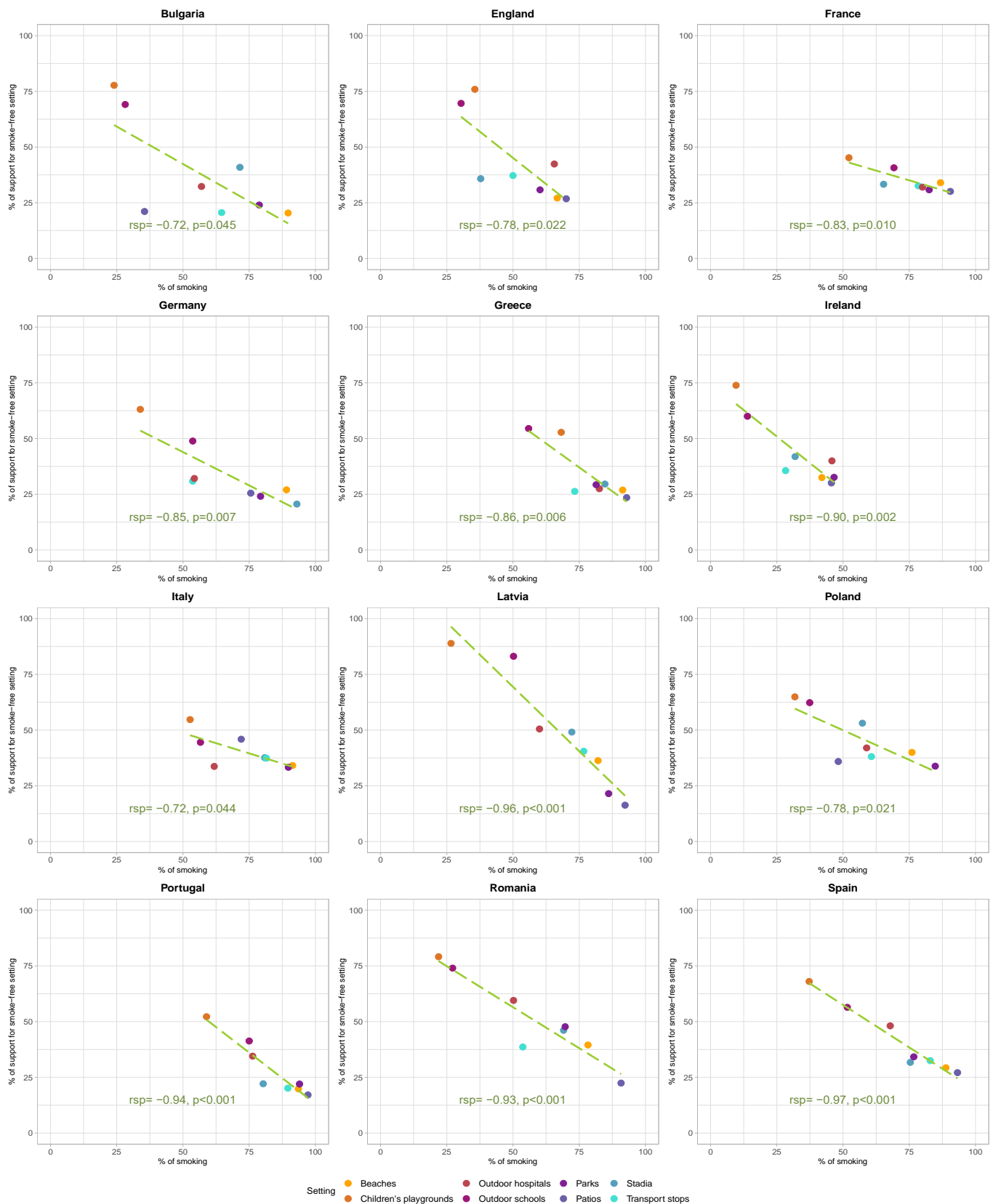


Figure 4. Scatterplots of the correlation (Spearman's  $r_{sp}$  correlation and p-value) between smokers' support for smoke-free legislation in diverse outdoors settings and reported smoking in 12 European countries – The TackSHS Survey, 2017-2018.





#### 4. DISCUSSION

There is extensive support for the implementation of smoke-free legislation among non-smokers in this study, with the majority being in favour of smoke-free legislation in all indoor settings studied with only two exceptions: smoke-free legislation in private cars in Portugal (48.6%) and Poland (40.1%). Also, most non-smokers supported smoke-free legislation in outdoor settings in all countries, with exceptions in a few settings in Germany, France and Greece. Non-smokers' overall support, meaning the support of samples of all countries compiled, was higher than 75% for all indoor settings, apart from private cars/cars with minors, and higher than 50% for all outdoor settings. As expected, smokers' support for smoke-free legislation was lower than non-smokers' support; yet the level of support among smokers was also substantial, with the majority of the overall sample of smokers supporting smoke-free policy in all indoor settings and a considerable percentage supporting smoke-free outdoor settings.

Expectedly, our results also point to differences in support for smoke-free legislation across European countries and geographic regions. For most settings, the support for smoke-free legislation was directly correlated with the countries' geographic position within Europe, the prevalence of SHS presence, and the reported smoking among participants in each setting...

Non-smokers' support for smoke-free legislation was associated with prevalence of SHS presence and, although we have not tested this hypothesis here, it is very likely that the levels of support are also associated with the smoke-free legislation implemented in each country and with the levels of compliance. Our study adds to the body of research that shows an inverse association between the prevalence of SHS exposure and the support for smoke-free legislation (Feliu et al., 2019; Hyland et al., 2009; Mons et al., 2012) and more strict smoke-free legislation (Martínez-Sánchez et al., 2010).

Historically the demand for and implementation of smoke-free legislation has been associated with evidence of the harms caused by SHS exposure. Most of this evidence produced is relative to enclosed places, and so most of the smoke-free legislation implemented to date covers these indoor settings (IARC Working Group on the Evaluation of Carcinogenic Risks to Humans, 2004). In more recent years, research has pointed that the prevalence of exposure to SHS in outdoor spaces (open and semi-open) is not negligible, especially in areas adjacent to enclosed settings where it is forbidden to smoke, highlighting the importance to extend smoke-free legislation to such areas (Fu et al., 2016; Sureda et al., 2018, 2013, 2012). Unsurprisingly, our results show that overall the population supported smoke-free legislation for indoor settings substantially more than for outdoor settings, as only a few countries have enacted legislation covering them, and therefore smoking is probably normalised in these outdoor settings. However, our results show that the majority of non-smokers', who are 74.1% of the adult population across the 12 countries studied (Gallus et al., 2021), would be supportive of extending smoke-free legislation to these settings. Smokers, on the other hand, were less supportive of such legislation, and this lower support was associated to their reported smoking in these settings. Evidence points to the influence of smokers' support for smoke-free legislation and the levels of compliance with said policies (Fong et al., 2006; Francis et al., 2010). Therefore, it would be advisable to further investigate and manipulate other variables that might be associated with smokers' support, such as knowledge of secondhand smoke exposure harms and attitudes towards smoking, and design interventions to increase them (Nogueira et al., 2021).

Markedly, those legislations related to the protection of children, namely smoke-free playgrounds and outdoor areas of schools, were the settings with the highest level of support among all outdoor places assessed. Such association has also been pointed out in other studies with nationally representative samples (Fu et al., 2018; Gallus et al., 2012; Nogueira et al.,

2020). Additionally, support for protecting children inside cars was also high despite the fact that such restrictions would be applied to what some consider as a private setting, and that therefore it should not be regulated by the state (Rouch et al., 2010). Another study has also shown that support for the protection of children relates to tobacco control policy support and that this association was also true for smokers (Kuijpers et al., 2018). Considering that children continue to be exposed to high levels of SHS in such places (Henderson et al., 2021a, 2020), which points to the need for legislation to protect them, our study shows that the public opinion would be in favour of total smoking bans in playground, school entrances and private cars with minors.

In our study, given the cross-sectional nature of the data, we only explored the association of support with a few variables, therefore we did not have the intention to evaluate the causal factors of support for smoke-free legislation. However, we believe that it would be extremely beneficial for the advocacy of tobacco control to understand better the determinants of support and how we can influence public opinion, as some researchers point to it as a very influential (and sometimes underestimated) factor in policy adoption (Burstein, 1998).

Some limitations of this study merit consideration. Our results are based on self-reported data, collected in face-to-face interviews. This might have had implications on the results, more specifically when it comes to participants reporting support or opposition to smoke-free legislation, as social-desirability may be a source of bias. Additionally, it is important to mention that SHS presence and smoking was also based on participants' recollection of smoking/seeing someone smoking in the places and, therefore, recall bias might influence our results. Nevertheless, our study also has several strengths; it is based on representative samples of the adult population of the 12 countries studied, data on several diverse settings were

collected using a standardised questionnaire in all countries, making setting and cross-country comparisons possible.

## **5. CONCLUSIONS**

In conclusion, our study demonstrates that there is a substantial support for smoke-free legislation, both for indoor and for selected outdoor settings in the 12 European countries studied. Considering that smoke-free legislation has not been implemented homogeneously in these countries, our results can be seen as an opportunity to advance legislation and protect the population from the harms of SHS exposure.

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