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Association between tobacco control policies and smoking behaviour among adolescents in 29 European countries

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ABSTRACT

Aims To investigate the associations between well-known, cost-effective tobacco control policies at country level and smoking prevalence among 15-year-old adolescents. **Design** Multi-level modelling based on the 2005–06 Health Behaviour in School-aged Children Study, a cross-national study at individual level, and with country-level variables from the Tobacco Control Scale and published country-level databases. **Setting** Twenty-nine European countries. **Participants** A total of 25 599 boys and 26 509 girls. **Main outcome measures** Self-reported regular smoking defined as at least weekly smoking, including daily smoking (dichotomous). **Findings** Interaction effects between gender and smoking policies were identified, therefore boys and girls were analysed separately. Large cross-national differences in smoking prevalence were documented. Intraclass correlations (ICC) of 0.038 (boys) and 0.035 (girls) were found. In the final multi-level model for boys, besides the significance of the individual variables such as family affluence, country-level affluence and the legality of vending machines were related significantly to regular smoking [b(country affluence) = –0.010; b(partial restriction vending machines) = –0.366, $P < 0.05$]. Price policy was of borderline significance [b(price policy) = –0.026, $P = 0.050$]. All relationships were in the expected direction. The model fit is not as good for girls; only the legality of vending machines had a borderline significance in the final model [b(total ban vending machines) = –0.372, $P = 0.06$]. **Conclusions** For boys, some of the currently recommended tobacco control policies may help to reduce smoking prevalence. However, the model is less suitable for girls, indicating gender differences in the potential efficacy of smoking policies. Future research should address this issue.

Keywords Adolescents, Europe, multi-level model, smoking, tobacco control policy.

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INTRODUCTION

Tobacco use is one of the largest threats to public health and a leading preventable cause of death in the world [1,2]. If current smoking patterns continue, it has been estimated that total tobacco-attributable deaths will rise to 6.4 million in 2015 and 8.3 million in 2030 [3]. The onset and development of cigarette smoking occurs primarily during adolescence [4,5]. About half the smokers who start smoking cigarettes in their teens will die of a tobacco-related disease if they continue to smoke [6]. The younger they start, the greater their risk of habitual smoking [7]. Among European 15-year-olds, daily smoking prevalence rates in 2002 ranged from 5.5% (Sweden) to 20.0% (Latvia) in boys and from 8.9% (Poland) to 24.7% (Austria) in girls [8].

In 1999, the World Bank reported on the most effective tobacco control policies [9]. Recommended cost-effective tobacco control initiatives included tobacco price increases, bans or restrictions on smoking in public places, consumer information, tobacco advertisement bans, health warnings on packages and treatment to

*A list of the principle investigators and participating countries in the HBSC Research Network can be found at the end of the paper.

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quit. However, most research in the field of smoking policy strategy was based on US data and focused upon the effect of the price of cigarettes on smoking prevalence. Price increases were found to have a specific effect on young people [10–12]. In an international study on data of 87 countries, higher cigarette prices appeared to prevent the onset of smoking, but also resulted in smokers quitting or smoking less [13]. Similarly, cigarette promotions that result in effective price reductions were found to facilitate the movement from initiation to regular smoking among young people [14].

The effectiveness of a policy may differ for adults and youth. Bans on tobacco advertisements have elicited mixed results in relation to their effects on smoking prevalence among adults [12], but in adolescents there was evidence that youth tend to recall advertisements that are pro-smoking [11] and that exposure to tobacco advertisements and promotions were associated with the likelihood that adolescents will initiate smoking behaviour [15]. Point-of-sale advertisements were especially found to encourage youth smoking [14]. Bans or restrictions on smoking in public places have had a greater effect among older people than on youth [10,16]. Recent longitudinal research showed that local smoke-free restaurant laws decreased the transition from experimentation to established smoking [17]. Further, it was suggested that information campaigns in the media may have smaller or no effects on youth compared with other population subgroups [10,18,19], although Emery *et al.* [20] found that state-sponsored anti-tobacco media campaigns were associated with less smoking in youth. Health warnings on cigarette packets were not found to be particularly effective in reducing smoking behaviours; however, warnings on plain white packages may be more effective than warnings on regular packages [21]. Cessation treatment concerns quitlines, cessation support networks, reimbursement of treatment expenses and medications to stop smoking [9]. These activities generally target highly dependent adult smokers, and are rarely targeted specifically at youth. Finally, there is some evidence that restrictions or bans on the sale of cigarettes to minors reduced smoking and cigarette consumption in youth [22,23]. However, it appears that this policy has a relatively limited impact due to weak enforcement. In their review, Fichtenberg & Glantz [24] found no effect of youth access interventions on smoking in adolescents.

Youth protection against tobacco is part of the World Health Organization's (WHO) Framework Convention on Tobacco Control (FCTC) [25]. Effective legislative, executive, administrative or other measures should be undertaken by countries who have signed the convention. However, a recent report from the World Health Organization described that only around 5% of the total world population is covered by any one of the above-described key policy interventions [26]. A gap remains in the understanding of effective policy for youth protection against smoking in Europe.

The present study aims to investigate smoking policies in 29 European countries in relation to the national smoking prevalence among young people. Our study focuses upon 15-year-olds, because early adolescence is a critical time for acquiring new patterns of behaviour that could track into adulthood.

METHOD

Sample

The 2006 Health Behaviour in School-Aged Children Study (HBSC) is a study of nationally representative samples of adolescents in 41 countries or regions [27]. In each country, a hierarchical design was employed with the school or class being the sampling unit. Three age categories of young people were sampled (11-, 13- and 15-year-olds). Recommended sample sizes for each country were 1536 students per age group, resulting in a data set with more than 210 000 students. Sample sizes assured a 95% confidence interval of $\pm 3\%$ for prevalence estimates [27].

Only the 15-year-olds were used in the current analyses. The category of 15-year-olds included 90% of students between the ages of 15.0 and 16.0 years, and 10% of students aged 14.5–15.0 or 16.0–16.50 years. Prevalence rates of weekly smoking in the other age groups were too low for analyses (i.e. in 13-year-old boys ranging from 1% in Norway and Sweden to 11% in Latvia and Estonia). For the present study, male and female students aged 15 years were included from 29 European countries for which uniform country-level data from the Tobacco Control Scale [22] were available.

Measures

Data were collected on two levels. The individual-level data included student self-reports of their smoking behaviour as well as their gender, age and the Family Affluence Scale (FAS) [28] as an indicator of socio-economic status (SES). The question on smoking was formulated as follows: 'How often do you smoke tobacco at present?', with response options: 'every day', 'at least once a week but not every day', 'less than once a week' and 'I do not smoke'. In the analyses, the smoking variable was dichotomized into regular smoking (defined as at least weekly smoking, including daily smoking) and non- or irregular smoking (smoking less than once a week or not at all). The analyses were repeated subsequently with daily smoking only.

The FAS comprised four questions about the family, including: having a vehicle, having your own bedroom,

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going on holidays with the family and having a computer [28]. Andersen *et al.* [29] found a good to excellent agreement between child and parental FAS responses (kappa agreement between 0.41 and 0.74). Boyce *et al.* [30] reported good criterion validity from the aggregated FAS score on country level compared with the Gross Domestic Product (GDP) (kappa agreement of 0.57). Validation studies have shown that FAS can be used as a cross-national indicator of child material affluence and as predictor of health outcomes [28]. The FAS scores were divided into tertiles per country (low, medium and high). These categories indicate the relative material affluence of the student within their country.

Second-level data comprised information on the participating countries gathered by Joossens *et al.* [31] for the Tobacco Control Scale (TCS), from the European Network for Smoking Prevention (ENSP) country files 2006 (selling to minors and penalties, vending machines) and the Tobacco Atlas (smoking prevalence of adults). Joossens *et al.* [31] developed a TCS for European countries to measure the grade of implementation of the six most effective policies as described by the World Bank [9]. The scale was developed by means of a questionnaire that was sent to the ENSP correspondents within the countries. The questionnaire data were collected in 2005 and contained several questions on the six different policies [31]. Data on the scale were gathered in a systematic manner prior to the individual data collection. We can therefore employ a predictive model, following the rationale that policy influences behaviour not directly, but only after a certain delay. Each subscale was weighted by its reported effectiveness based on existing research and the discussion of a panel of tobacco control experts [31]. For the present analysis, selection was made based on the literature and relevance for an adolescent population. The subscales 'price' (from 0–30 based on two questions: ratio of price of Marlboro and price of most popular brand to GDP per capita), 'smoking bans in public places' (from 0 to 22, based on four questions on work-places, cafés and restaurants, public transport and other public places) and 'bans on advertisements' (from 0 to 13, based on nine questions including bans on tobacco advertising on television, outdoors, in the print media and bans on indirect advertisement and sponsorship) of the TCS were included. The subscale on 'information campaigns' and 'cessation treatment' were excluded. No information was available on tailoring of information campaigns and the quality of these campaigns was not assessed. Moreover, data were missing for one country (Portugal). Also, no information was available on tailoring cessation treatments towards young people. The correlation between smoking prevalence and the score on this policy measure was not significant (in boys $P = 0.933$ and in girls $P = 0.422$). The subscale 'health warnings' was excluded because little variation was identified between countries.

A combination of laws about selling to minors and penalties for such selling [32] resulted in a new variable, 'selling to minors', with three categories: legal to sell to minors; illegal to sell to minors but without penalties for the seller; and illegal to sell to minors with penalties for the seller. A second new variable was constructed for these analyses, namely 'legality of vending machines' with answer categories: 'legal', legal in specific places' and 'illegal' [32]. Finally, the affluence of the country (calculated here as the GDP of a country in euros divided by the population of a country) [33] and the smoking prevalence of adults [34] were also included.

Statistics

As the data were structured hierarchically (adolescents within countries), a multi-level regression model (mixed-effects logistic regression) [35] was applied with regular smoking at the individual level as outcome and predictor variables at both the individual level (age and FAS) and country level ('price', 'smoking bans in public places', 'bans on smoking advertising', 'selling to minors', 'legality of vending machines', smoking prevalence of adults and affluence of the country).

Several consecutive models were tested: first the null model (or intercept-only model), where no predictor variables were included. The next model tested only the individual-level predictors as fixed effects (model 1). In addition, several models were tested with the individual-level predictors and country-level predictors added as fixed effects sequentially. Finally, a model with individual level predictors and all country-level predictors with significance levels of <0.25 in the previous models was tested; this was the final multi-level model. An alpha level of 0.25, instead of the more common 0.20, was chosen to give a more complete picture of the situation [36]. Analyses were conducted separately for boys and girls, as significant interactions were found initially between gender and the country-level variables.

The SAS release 9.1 software was used for the analyses [37]. The Glimmix procedure was applied as it fits generalized linear mixed models where the response variable is not necessarily distributed normally. The Kenward–Roger method [38] was used to compute the degrees of freedom for the tests of fixed effects, as it adjusts for any bias in fixed-effects standard errors. The deviance was calculated as a fit statistic of the model (−2 residual log pseudo-likelihood). This deviance should decrease when predictor variables are added to the model. The country-level variance (variance estimate of the country-level residual errors) was calculated. When the variance decreases from the null model to the final model

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(with the country-level variables), it means that some of the country-level variance is explained by the country predictors.

RESULTS

The regular smoking prevalence of boys and girls can be found in Table 1. In total 25 599 boys and 26 509 girls were included in the analyses. Large cross-national differences in smoking prevalence were identified: from 8.6% regular smokers in Sweden to 32.1% regular smokers in Bulgaria. Large gender differences were also found between countries (Table 1). Table 2 shows the country-level variables employed in these analyses. Multi-level modelling was performed. In the null model, the country-level variance (the variance estimate of the country-level residual errors) was 0.1305 [standard error (SE) 0.038] for boys and 0.1195 (SE 0.034) for girls. Based on these country-level variances, an intraclass correlation (ICC) of 0.0382 was calculated for regular smoking in boys, which indicates that 3.8% of regular smoking in boys can be explained by the country structure. In girls, the ICC was 0.035 which indicates that 3.5% of regular smoking in girls can be explained by the country structure. The deviance of the model for boys was 121 628; for girls, the deviance was 124 866.

Table 1 Description of the population: numbers of boys, girls and total prevalence of at least weekly smoking in boys, girls and total by country.

	Total number of students	*At least weekly smoking (%)*		
		Boys	*Girls*	*Total*
Austria	1494	24.1	29.7	27.1
Belgium	3030	16.3	17.3	16.8
Bulgaria	1688	27.5	36.2	32.1
Czech Republic	1665	19.7	23.4	21.6
Denmark	1552	15.2	14.8	15.0
Estonia	1587	26.5	18.6	22.6
Finland	1685	23.0	21.0	21.9
France	2222	16.5	20.6	18.5
Germany	2552	16.8	22.4	19.6
Greece	1416	17.0	16.1	16.5
Hungary	1187	22.2	21.4	21.8
Iceland	1883	13.7	13.1	13.4
Ireland	1685	18.5	19.7	19.1
Italy	1335	20.0	19.6	19.8
Latvia	1330	29.9	22.7	26.1
Lithuania	1861	25.8	17.6	21.8
Luxembourg	1507	16.8	21.3	19.0
Malta	354	19.3	23.7	21.4
Netherlands	1363	15.7	20.6	18.2
Norway	1534	9.3	12.5	10.8
Poland	2287	18.5	14.2	16.3
Portugal	1383	9.3	12.0	10.8
Romania	1605	20.2	11.7	14.9
Slovakia	1252	18.4	15.2	16.7
Slovenia	1561	19.7	16.4	18.1
Spain	3065	14.3	21.1	17.7
Sweden	1526	7.8	9.4	8.6
Switzerland	1500	15.3	15.2	15.3
Great Britain	4999	13.4	21.3	17.3

Model 1, with only the individual variables, indicates similar results for boys and girls. Students with a low FAS score were significantly more likely to smoke regularly compared with those with high FAS scores ($P = 0.001$). In girls, those with a low and medium FAS score were more likely to smoke regularly than girls with a high FAS score (low–high: $P < 0.01$; medium–high: $P = 0.011$).

In further models, country-level variables were included one by one. Only the country variables with a P-value < 0.25 were included in the final model. These are for boys: 'price' ($P = 0.009$), 'bans on advertisements' ($P = 0.112$), 'legality of vending machines' ($P = 0.128$), adult smoking prevalence ($P = 0.035$) and affluence of the country ($P = 0.005$). For girls, only 'smoking bans in public' ($P = 0.131$) and 'legality of vending machines' ($P = 0.114$) met the criteria to be included in the final model. The policy measure 'sales to minors' was omitted for boys and girls (boys: $P = 0.916$; girls: $P = 0.790$). For boys, 'smoking bans in public' was also omitted ($P = 0.366$). For girls, the measures on 'price' ($P = 0.534$) and 'bans on advertisements' ($P = 0.253$) were also omitted.

The results of the parameter estimates of the final multi-level models are reported in Table 3. For boys, besides the significance of the individual variables, affluence of the country and legality of vending machines were related significantly to regular smoking ($P < 0.05$). The association between country affluence and smoking was negative: the higher the affluence of the country the less regular the smoking (Fig. 1). In addition, less regular smoking was observed when partial restriction of vending machines was in place compared to when there was no restriction. Borderline significance was found for a total restriction of vending machines when compared to no restriction. Price policy was of borderline significance ($P = 0.051$), indicating a trend where fewer boys were regular smokers when countries had a high price policy compared to a lower price policy (Fig. 2).

In the final multi-level model, the deviance decreased for boys from 121 628 to 117 848. In girls, the decrease in deviance was smaller: from 124 867 to 122 793. In boys, country-level variance decreased substantially compared to the null model (from 0.130 to 0.069, SE = 0.024). Thus, a considerable degree of the country-level variance can be explained by the five country-level variables. In contrast, the final multi-level model in girls resulted in only a modest decrease of the country-level variance (from 0.119 to 0.111, SE = 0.034). Thus, for girls, the model fit was less than optimal and only the

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Table 2 Country-level variables.

	Price[a]	*Public bans*	*Advertising bans*[a]	*Penalties selling minors*[b]	*Vending machines*[b]	*Adult smoking (%)*[c]	*Affluence (GDP/ population; in 1000 euros per inhabitant)*[d]
Austria	14	4	4	No sales, no penalties	No restriction	24.5	28.88
Belgium	16	8	12	No sales, no penalties	Partial restriction	28.0	27.29
Bulgaria	19	6	9	No sales, and penalties	No restriction	36.5	2.49
Czech Republic	12	6	9	No sales, and penalties	Partial restriction	29.0	8.45
Denmark	17	3	10	No sales, no penalties	No restriction	30.5	36.02
Estonia	14	9	11	No sales, and penalties	Total ban	32.0	6.58
Finland	18	12	13	No sales, and penalties	Partial restriction	23.5	28.69
France	23	6	11	No sales, and penalties	Total ban	34.5	27.52
Germany	20	2	4	No sales, and penalties	Partial restriction	35.0	26.74
Greece	17	7	4	No sales, and penalties	Total ban	38.0	14.97
Hungary	17	6	10	No sales, and penalties	Total ban	35.5	7.94
Iceland	25	11	13	No sales, and penalties	Total ban	24.0	33.87
Ireland	23	21	12	No sales, and penalties	Partial restriction	31.5	36.30
Italy	16	17	10	Sales to minors	Partial restriction	24.9	23.34
Latvia	9	6	6	No sales, no penalties	Total ban	31.0	4.77
Lithuania	11	6	9	No sales, and penalties	Total ban	33.4	5.20
Luxembourg	7	4	5	No sales, and penalties	Partial restriction	33.0	56.78
Malta	19	17	9	No sales, and penalties	Partial restriction	23.9	10.83
Netherlands	16	9	12	No sales, and penalties	Partial restriction	33.0	28.68
Norway	26	17	13	No sales, and penalties	Total ban	31.5	44.00
Poland	16	10	12	No sales, and penalties	Total ban	34.5	5.11
Portugal	17	5	10	No sales, no penalties	Partial restriction	18.7	12.89
Romania	13	6	0	No sales, and penalties	Total ban	43.5	2.72
Slovakia	18	8	11	No sales, and penalties	Partial restriction	42.6	6.16
Slovenia	13	6	7	No sales, and penalties	Total ban	25.2	12.97
Spain	12	3	3	No sales, and penalties	Partial restriction	33.4	19.78
Sweden	19	15	13	No sales, and penalties	Partial restriction	19.0	31.08
Switzerland	15	5	4	Sales to minors	No restriction	33.5	39.09
Great Britain	30	1	11	No sales, and penalties	Partial restriction	26.5	28.65

[a]From Joossens & Raw, 2006 [31] [price subscale is based on price of Marlboro and price of packet of cigarettes in the most popular price category, taking into account Gross Domestic Product (GDP); public bans subscale is based on bans in work-place, cafes and restaurants, public transport and other public places (schools, etc.); advertising bans based on bans on television, outdoor advertising, printing media, indirect advertising, point of sale, cinema, sponsorship, internet, radio]. [b]From ENSP, 2006 [32]. [c]From Mackay & Eriksen, 2002 [34]. [d]From Eurostat, 2005 [33].

legality of vending machines was of borderline significance in the final model ($P = 0.060$).

The analyses were repeated with self-reported daily smoking as the outcome. The results were broadly similar; the same policy variables were related to daily smoking. There were two exceptions; for boys, daily smoking was related significantly to adult smoking rates ($P = 0.020$), while affluence of the country was of borderline significance ($P = 0.082$).

DISCUSSION

These analyses show that 3.8% of the variance in regular smoking among boys and 3.5% of the variance in regular smoking among girls can be attributed to the country structure or the residence of an adolescent in a certain country. In boys a substantial part of the country-level variance could be explained by the selected country-level variables, but much less so for girls.

An efficient price policy (high ratio of cigarette prices/ GDP) is associated with less regular smoking in boys, but not girls. Guindon *et al.* [13] describe three main reasons why price can be an effective deterrent in youth. Younger individuals may not be as addicted to nicotine as long-term users and may therefore be more able to curb their consumption. Secondly, as a result of having fewer smoking peers, the normative belief that almost all young people are smokers may be reduced and a multiplying effect of the price control can be expected. Thirdly, youth are more responsive to price changes because of their relatively smaller disposable incomes. Previous research found that, in adolescents, an increase of 10% in cigarette price can result in a decrease of up to 17% in

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Table 3 Parameter estimates of the final multi-level model with regular smoking as dependent variable, separately for boys and girls and controlled for age and Family Affluence Scale.

	Regression coefficient (SE)	*Odds ratio*[a]	*df*	*F value*	*P value*
Boys					
Price	–0.026 (0.013)	0.97	1	4.33	0.050
Advertising bans	0.009 (0.019)	1.01	1	0.21	0.651
Affluence of country	–0.010 (0.004)	0.99	1	5.55	0.028
Adult smoking	0.016 (0.010)	1.02	1	2.49	0.128
Vending machines			2	3.09	0.067
Total ban	–0.310 (0.161)	0.73			0.069
Partial restriction	–0.366 (0.149)	0.69			0.023
No restriction	–	1			–
Girls					
Public bans	–0.018 (0.013)	0.98	1	1.82	0.189
Vending machines			2	2.05	0.151
Total ban	–0.372 (0.189)	0.69			0.060
Partial restriction	–0.199 (0.186)	0.82			0.294
No restriction	–	1			–

[a]The units of measurement of the variables are the same as presented in Table 2. SE: standard error.

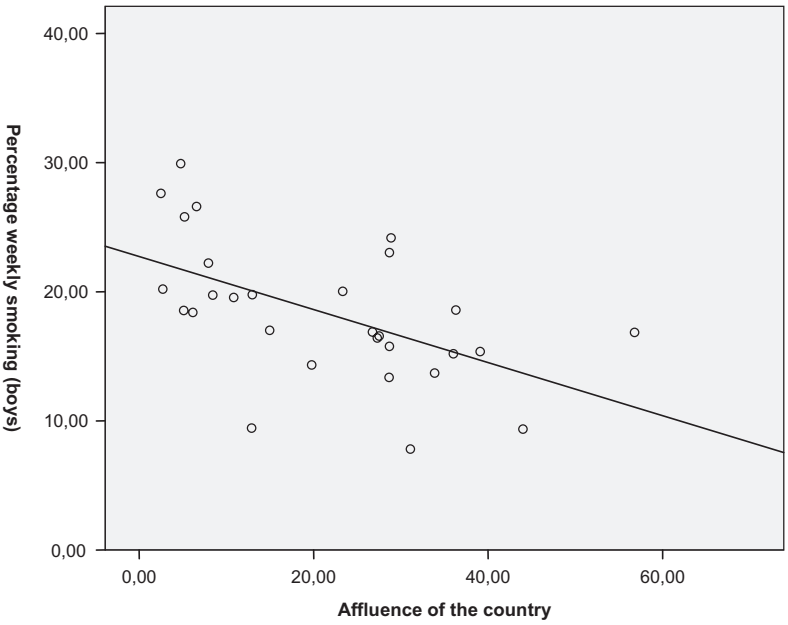

Figure 1 Relation between affluence of the country and weekly smoking in boys (raw data)

smoking prevalence [18,39]. Conversely, in Canada, where the taxes on cigarettes decreased, Zhang *et al.* [40] found that the greater the tax reduction, the higher the rates of smoking initiation. Even when findings are controlled for individual characteristics (such as age, gender, educational attainment, income, marital status) and other local tobacco control policies (such as smoke-free laws in restaurants, enforcements, signage, tobacco control expenditures), the association between cigarette price reduction and smoking initiation was still significant. A study by Schnohr *et al.* [41] on 2001–02 HBSC data found no significant relationship between price (in purchasing power parity) and daily smoking prevalence in 13- and 15-year-old adolescents. We restricted the analysis to 15-year-olds only. Fifteen-year-olds may be more sensitive to price increases than 13-year-olds, as they are more likely to buy their cigarettes instead of obtaining them from others.

However, our results indicate that high price policy is related to lower smoking prevalence for only boys, not girls. This may be explained at least partially by gender differences in how adolescents obtain their cigarettes. Previous research found that females were more likely to obtain cigarettes from non-commercial sources, such as family and (older) friends [42–44]. In contrast, males are more likely than females to buy cigarettes in a shop or

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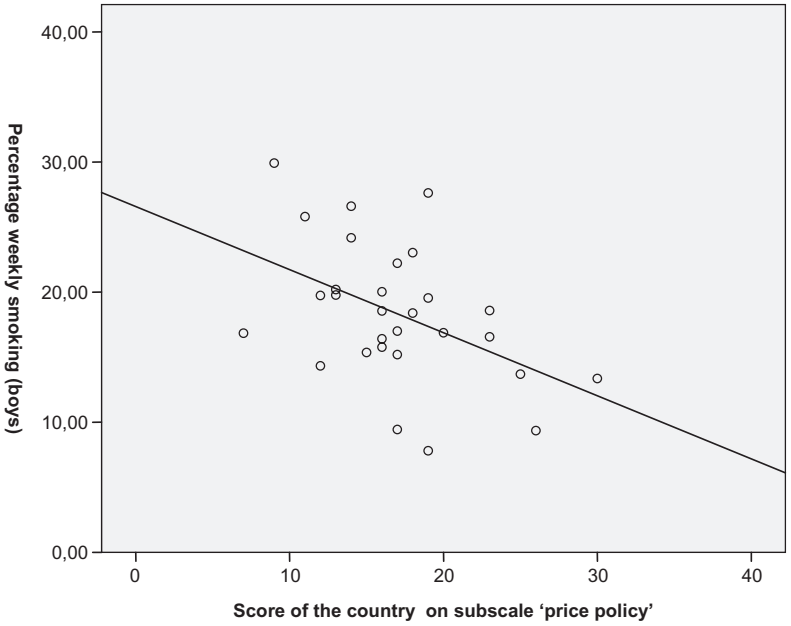

Figure 2 Relation between price policy scores and weekly smoking in boys (raw data)

from vending machines [44] and are therefore more directly susceptible to price increases.

In the line with the latter, we find that a restrictive policy on vending machines is related significantly to less regular smoking in boys and in girls, but in girls the results are of borderline significance. Both Pokorny *et al.* [45] and Stead & Lancaster [46] point out the importance of the availability of vending machines. It may be that a policy concerning legal purchase of cigarettes for those over 18 years had a relatively limited impact because of the widespread availability of cigarette vending machines.

In contrast, the other tobacco control policies included were not related to regular smoking in young people. Previous research has argued that restrictions or bans on cigarette sales to minors are not very effective due to weak enforcement of the law [45,46]. Catrucci *et al.* [43] and Harrison *et al.* [42] found that younger adolescents are more likely to obtain their cigarettes from non-commercial or social resources, while commercial resources become more important once regular use is established. Bans on smoking in public places and on advertisements are not related to less regular smoking in our study. It may be that these policies become more effective in the long term, as they help to create non-smoking social norms.

There are some limitations to our study. First, causal relationships between policy and smoking prevalence cannot be studied in cross-sectional research. It could be that higher taxes and stronger policies will be implemented in countries where anti-smoking sentiment is already high and smoking prevalence is low. It could also be that fewer policies will be implemented in countries where smoking is not (yet) a recognized problem. Only longitudinal research can address this. Secondly, only smoking prevalence is studied and not smoking behaviour such as number of cigarettes, inhalation methods, and type of cigarettes. As price policy has an influence on smoking prevalence in boys, we should be mindful of possible compensating behaviour. In high-tax states, young adults smoke longer cigarettes and smoke cigarettes higher in tar and nicotine compared with young adults in low-tax states [18]. A final limitation is the lack of an intermediate level in the analyses, namely the school level. Unfortunately, no information was available on smoking policy in the participating schools.

To conclude, given the detrimental health effects of smoking, prevention of smoking initiation and escalation in early adolescence through effective health promotion as well as through effective policy initiatives is a priority. Our study shows that, for boys, some of the currently recommended tobacco control policies may help to decrease smoking prevalence. Interestingly, however, the results also show that gender differences exist in how policy influences young people's smoking behaviour. These current policy measures are not sufficient for girls. Future research is required to address this gap in more detail.

Declarations of interest

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Principle investigators

The International Coordinator of the 2005–06 survey was Candace Currie and the Data Bank Manager was Oddrun Samdal. The 2005–06 survey was conducted by principal investigators in 41 countries: Austria (Wolfgang Dür), Belgium–Flemish (Carine Vereecken), Belgium–French (Danielle Piette), Bulgaria (Lidiya Vasileva), Canada (William Boyce), Croatia (Marina Kuzman), Czech Republic (Ladislav Csémy), Denmark (Pernille Due), England (Antony Morgan), Estonia (Katrin Aasvee), Finland (Jorma Tynjälä), France (Emmanuelle Godeau), Germany (Ulrike Ravens-Sieberer), Greece (Anna Kokkevi), Greenland (Birgit Niclasen), Hungary (Ágnes Németh), Iceland (Thoraddur Bjarnason), Ireland (Saoirse Nic Gabhainn), Israel (Yossi Harel), Italy (Franco Cavallo), Latvia (Iveta Pudule), Lithuania (Apolinaras Zaborskis), Luxembourg (Yolande Wagener), TFYR Macedonia (Lina Kostorova Unkovska), Malta (Marianne Massa), the Netherlands (Wilma Vollebergh), Norway (Oddrun Samdal), Poland (Joanna Mazur), Portugal (Margarida Gaspar De Matos), Romania (Adriana Baban), Russia (Alexander Komkov), Scotland (Candace Currie), Slovak Republic (Elena Morricova), Slovenia (Helena Jericek), Spain (Carmen Moreno Rodriguez), Sweden (Ulla Marklund), Switzerland (Michel Graf), Turkey (Oya Ercan), Ukraine (Olga Balakireva), USA (Ron Iannotti) and Wales (Chris Roberts). For details, see http://www.hbsc.org

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