Full length article

Tobacco control policy and socio-economic inequalities in smoking in 27 European countries

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ABSTRACT

Background: Higher Tobacco Control Scale (TCS) scores, in the early 2000s were associated with higher smoking cessation rates across Europe, both among lower and higher educated people. We aimed to assess if this association held in recent years.
Methods: Repeated cross-sectional Eurobarometer surveys were used, in 27 European countries from 2006 to 2012 (study sample = 73,617 adults). We used multilevel regression to model associations between the TCS (ranging from 0 to 100, quantifying: tobacco price, smoke-free laws, mass-media campaigns, advertising bans, warning labels, and cessation support) and both smoking cessation and cigarettes smoked per day. We modelled associations according to respondents' education and occupation, with adjustment for age, sex, and survey-wave.
Results: We found no association between the TCS and smoking cessation for lower or middle educated respondents, but we did find an association for higher educated respondents (OR: 1.13, 95%CI: 1.08 to 1.19). For smoking intensity, we observed no associations with the TCS for lower educated respondents (beta: 0.04, 95%CI: −0.33 to 0.41) but we did observe significant associations for middle (beta: −0.25, 95%CI: −0.47 to −0.03) and higher educated respondents (beta: −0.27, 95%CI: −0.55 to −0.01). Associations were observed for both manual and non-manual classes, but not for those not working for pay. Of the TCS domains, none were associated with smoking cessation for lower educated respondents, but five were for higher educated respondents.
Conclusions: Associations between tobacco control policies and smoking cessation were found mostly among higher socioeconomic groups. This underlines the need for specific tobacco control policies that explicitly focus on reaching low socio-economic groups.

1. Introduction

While it has long been known that 1 in 2 smokers will die from regular smoking, recent studies show it might even be 2 out of 3 smokers (Doll et al., 2004; Jha et al., 2013; Pirie et al., 2013). Combined with persistently high prevalence rates globally, this means that smoking is a long way from relinquishing its position as a major threat to global health. Many steps have been taken to combat this deadly addiction, the ratification of the Framework Convention on Tobacco Control (FCTC) being the foremost achievement (Clancy,

2009). The FCTC provides minimum requirements on a broad range of evidence-based tobacco control measures for signatory countries to implement.

Many European countries have been among the first to implement evidence-based tobacco control policies (Warner and Mendez, 2010). However, although these policies have contributed to reducing smoking rates in the European population as a whole (Mackenbach et al., 2013), there have been inequalities in the decline of trends in smoking (Bosdriesz et al., 2015a; Giskes et al., 2005). Inequalities by socio-economic status (SES) are especially worrying, as the smoking prevalence among those with a low SES is highest and is declining less rapidly, compared those with a higher SES. In a previous study, we found that whilst trends in the low and high SES groups were similar in Europe during the 1980s and early 1990s, there was a strong widening of inequalities from 2000 onwards (Bosdriesz et al., 2015a). This study did not directly test the

role of tobacco control policies during this period, but the results suggest that these policies have not been able to reduce the socio-economic inequalities, and they might even have contributed to the widening of inequalities.

Schaap et al. (2008) tested the association between national level tobacco control policies, measured by the Tobacco Control Scale (TCS) and smoking cessation in 18 European countries in the early 2000s. The TCS is a quantitative measure of the extent to which comprehensive tobacco control policies have developed. This scale contains six domains such as price, smoke-free laws, advertising bans, and cessation support. Schaap et al. found that countries with a higher TCS score had higher quit ratios, and that this association was similar for low and high SES groups. The increasing inequalities during later years suggest that tobacco control may have benefitted higher educated people more than their lower educated counterparts. Many more tobacco control policies have been introduced in these subsequent years. It is therefore important to assess whether the previously found association between tobacco control policy and socio-economic inequalities in smoking in the EU still held for the subsequent 10 years.

We aim to assess whether tobacco control policy was associated with socio-economic inequalities in smoking across the EU in the period 2006–2012. Because tobacco control policies can decrease consumption of tobacco not only by increasing smoking cessation, but also by decreasing smoking intensity (the number of cigarettes smoked per day), we will examine these two outcomes separately. In addition to associations with the total tobacco control score, we will also evaluate six components of tobacco control policy (e.g., price of tobacco). To do this, we will use recent data on smoking in all 27 EU countries from one single survey, and we will apply a multilevel design to assess the relationship of smoking with the TCS.

2. Methods

2.1. Population

The study population consists of respondents from the Eurobarometer surveys that were conducted on behalf of the European Commission to monitor public opinions in the Member States on various topics including smoking. We have selected the Eurobarometer survey waves that most closely matched the years for which data on our main predictor, the TCS, were available (2006, 2009 and 2012). The Eurobarometer surveys were administered face-to-face, in the appropriate language. Respondents were selected by random multi-stage probability sampling. The sampling method took into account the geographical and demographic distributions of each population, such that all samples are nationally representative. From each sample cluster, an initial address was randomly selected, and subsequent addressed were selected by following a random route procedure.

Each wave of the survey consisted of around 1000 respondents from each of the (at that time) 27 member states of the EU, which resulted in an initial study sample of 80,623 respondents for all three waves combined. From this, 4321 respondents younger than 20 were excluded. In addition 1061 more respondents were excluded because of missing values on smoking status and 1624 more respondents were excluded because of missing values on educational level. This resulted in a final sample of 73,617 respondents.

2.2. Variables

Smoking status was assessed by the question "Which of the following applies to you?" Those who answered "You smoke packed cigarettes", "You smoke roll-up cigarettes", and "You smoke cigars or a pipe" were classified as "current smokers". Those replying "You used to smoke but you have stopped" were categorised as "former smokers", and those replying "You have never smoked" were "never smokers". From these data, we derived the prevalence of current smokers (current smokers as a proportion of respondents) and the quit ratio (former smokers as a proportion of current plus former smokers). The intensity of smoking was measured among current smokers with the question "How many cigarettes a day do you smoke?". This number was measured in 9 categories, ranging from 1 to 4, 5–9 through >40. We have recalculated this variable to a continuous one, taking the mean number per category (3, 7, 12, 17, 22, 27, 32, 37, and 45).

To measure SES, we used both educational level and occupational level. Educational level was measured by the question "How old were you when you stopped full-time education?" The answers were categorised into three groups: '15 years or younger' was defined as low education, '16 to 19 years old' was defined as middle education and '20 years or older' was defined as high education. As we only included those aged 20 years and older, we assigned those still studying to the high education group. The Eurobarometer classified occupational class into 19 categories. We have merged these into three categories: manual (farmers, fishermen, craftsmen, skilled manual workers, servants), non-manual (professionals such as lawyers, accountants or doctors; business owners, middle and general management, desk functions, supervisors), and other (doing housework, students, unemployed, retired).

The main predictor was the tobacco control scale (TCS), as developed by Joossens and Raw in 2005 (Joossens and Raw, 2006). This scale ranges from 0 to 100 and quantifies tobacco control policy on six domains: price of tobacco, smoke-free areas, tobacco control budget, bans on tobacco advertising, health warning labels, and cessation support. The scores for these domains have been allocated on the basis of their effectiveness in reducing smoking, estimated from scientific evidence and experts' opinions. Tobacco control experts rated their countries' performance on each of the policy measures. The TCS has later been calculated for the years 2007, 2010, and 2013 (Joossens and Raw, 2011, 2007, 2006). However, the point allocation has been changed between these years to include newer types of policies, making the original TCS scores difficult to compare. To make the scores directly comparable, we have recalculated all scores using the 2013 scoring system (Joossens and Raw, 2013). We used the raw data for all of the separate measures provided in the 2005, 2007, and 2010 TCS reports to calculate the new scores (Joossens and Raw, 2011, 2007, 2006). These detailed scores are shown in Supplemental Table 1. For the main analyses, we used the overall score, and for additional analyses we used the separate scores on each of the six domains. For the analyses per domain, we recalibrated the scales, so that they all range from 0 to 10. We assigned the TCS scores per country to all respondents from that country, for the given year. The TCS scores of 2005, 2007 and 2010 were allocated to the Eurobarometer respondents of 2006, 2009 and 2012 respectively.

2.3. Statistical analysis

For descriptive purposes, the smoking prevalence rate for the total population and for each country separately was age-standardized by the direct method (Ahmad et al., 2001), using the new EU 27 standard population (Eurostat, 2013). In addition, we calculated the education and occupational ratios, by dividing the standardized prevalence rates for the high groups (high education and non-manual occupation) by the outcomes for the low groups (low education and manual occupation respectively).

To analyse the association between tobacco control and the two measures of smoking behaviour, we used multilevel regression