Economics and Human Biology 58 (2025) 101512

Contents lists available at ScienceDirect

Economics and Human Biology

journal homepage: www.elsevier.com/locate/ehb

Full length article

More Than a Ban on Smoking? Behavioural Spillovers of Smoking Bans in the Workplace☆

Joan Costa-Font [a,1], Luca Salmasi [b,1], Sarah Zaccagni [c,*,1]

[a] Department of Health Policy, London School of Economics and Political Science, London, United Kingdom
[b] Department of Economics and Finance, Catholic University, Rome, Italy
[c] Department of Economics and Business Economics, Aarhus University, Aarhus, Denmark

ARTICLE INFO

JEL classification:
I18
H75
L51

Keywords:
Joint formation of behaviours
Workplace smoking bans
Behavioural spillovers
Smoking
Drinking
Physical activity
Healthy identity
Russia

ABSTRACT

We study the potential behavioural spillover effects of a workplace smoking ban (WSB) on a variety of health-related behaviours as well as on people who are not directly impacted by the bans. Drawing on quasi-experimental evidence comparing employed and unemployed individuals in Russia, we document that individuals who give up smoking are less likely to drink or cut back on alcohol consumption. Furthermore, we show that as expected the WSB exerts an impact on the health behaviours of those who are not directly exposed to the reform, such as never smokers. Finally, the effects of the WSB are driven by changes among men, 60 percent of whom were smoking before the ban.

1. Introduction

Canonical demand for health models conceptualize health behaviours as resulting from an individual evaluation of their costs and benefits. However, when behaviours are jointly formed, or when different related behaviours feed a common health-related identity, a change in one specific behaviour can exert spillover effects on other behaviours (Truelove et al., 2014).

In this paper, we test for the presence of behavioural spillovers in health behaviours by examining whether an intervention that attempts to change a specifically targeted health behaviour at work (smoking) alters other non-targeted behaviours (physical activity or alcohol use). Similarly, we examine whether such an intervention modifies the behaviour of non-targeted individuals (non-smokers). The existence of behavioural spillovers has important implications for the evaluation of the welfare effects of policy interventions, as they suggest that such evaluations should consider general equilibrium effects above and beyond the targeted behaviours.

To date, the tobacco epidemic is responsible for the death of more than 8 million people a year around the world. More than 7 million of those deaths are the result of direct tobacco use, while around 1.2 million are the result of non-smokers being exposed to second-hand smoke.[2] Both workplace and public place smoking bans (WSBs and PPSBs, respectively), along with bans on tobacco advertising, take a prominent role among the policies that governments have articulated to discourage individuals from smoking. However, the evaluation of such smoking bans has so far devoted limited attention to the spillover effects they might produce both on other behaviours and on other subjects.

So far, most of the literature has considered the effect of smoking bans in public places (Carpenter et al., 2011; Adda and Cornaglia, 2010; Jones et al., 2015; Rong, 2017; Anger et al., 2011), while fewer studies have focused on the effects of bans in the workplace (Evans et al., 1999; Carpenter, 2009; Fichtenberg and Glantz, 2000). This is important given that WSBs restrict smoking for longer times every day

☆ We are grateful to Laura Derksen, Gregor Pfeifer, Erdal Tekin, and seminar participants at the 11th Workshop on the Economics of Risky Behaviour for their valuable comments.

* Corresponding author.
E-mail address: sarah.zaccagni@econ.au.dk (S. Zaccagni).

[1] All authors have contributed equally.

[2] Link: WHO2021.

https://doi.org/10.1016/j.ehb.2025.101512
Received 16 December 2024; Received in revised form 5 May 2025; Accepted 30 June 2025
Available online 16 July 2025

than bans in public places; hence, they might result in an additional effect compared to PPSBs.

This paper studies the effects of a WSB in Russia and, more specifically, examine a ban that was heavily enforced and unanticipated by the majority of the population. In fact, the World Health Organization (WHO) gave Russia a score of 7 on a scale of zero to 10 for compliance with regard to the implementation of smoking bans, which compared to that of other Western countries (WHO, 2017), and it gave rise to the longest period of decline in adult mortality since the 1960s.

We exploit the introduction of a WSB in 2013 as part of the tobacco control law in Russia, which banned smoking in all workplaces from 2013 and in public places from 2014.[3] Although there were no anticipated effects between bans, the existence of such effects would create attenuation bias.

We leverage such time differences to identify causal effects using a differences-in-differences (DiD) strategy. More specifically, we compare employed individuals, who were exposed to both bans, to unemployed individuals, considering potential selection into employment.

Our estimates suggest that the introduction of the WSB reduced the extensive margin of smoking behaviour by 2.9 percentage points among men, while no significant effects were found among women. However, when we look at the intensive margin, we do not find any significant change in the number of cigarettes smoked daily.[4] Consistently with evidence of behavioural spillover effects, we estimate a significant reduction in the number of alcohol users. However, the size of the effect on the extensive margin of alcohol use differs by gender, with a decrease of 6.7 and 3.5 percentage points for men and women, respectively. When we focus on the intensive margin, we find a decrease in alcohol consumption of about 10%, but only among men. We do not find any significant effect of the WSB on physical activity. Next, given that the proportion of people who stop drinking alcohol is higher than the proportion of people who quit smoking, we assess whether the WSB exerts an effect on people who are not directly affected by the ban. Consistent with the hypothesis of behavioural spillovers on non-targeted individuals, we document additional evidence of a significant reduction in alcohol use among never smokers who were indirectly exposed by living with other household members who quit smoking after the ban.

We contribute to the body of knowledge about the effectiveness of smoking bans. The literature on the economics of smoking is broad (see a comprehensive overview provided by Chaloupka and Warner (2000)), and includes studies that have investigated the effects of price changes induced by excise taxes (Wasserman et al., 1991; Becker et al., 1994; Yurekli and Zhang, 2000; Tauras, 2006; Carpenter and Cook, 2008; Hansen et al., 2017), the impact of legal restrictions on access to tobacco products (Chaloupka and Grossman, 1996; Gruber and Zinman, 2001; Kvasnicka, 2010), or the effects of public smoking bans on the exposure of non-smokers to second-hand smoke (Jiménez-Ruiz et al., 2008; Carpenter, 2009; Adda and Cornaglia, 2010). A few studies are more closely related to our research and investigate the effects of workplace smoking bans. For instance, Evans et al. (1999) find that WSBs in the U.S. significantly reduced smoking prevalence and daily tobacco consumption among those directly exposed to the restrictions compared to workers subject to minimal or no restrictions. In addition, no evidence of displacement of home smoking is reported by Carpenter et al. (2011). A review by Fichtenberg and Glantz (2000) concludes that workplace smoking restrictions were effective in reducing cigarette consumption and smoking prevalence. More recently, Adda and Cornaglia (2010), Jones et al. (2015), Rong (2017) find no effect while Anger et al. (2011) find some heterogeneous effects across individuals depending on the intensity of the exposure to the ban and Boes et al. (2015) detect some temporal effects. However, work in this area remains inconclusive and has focused mainly on the U.S. This study draws on novel evidence from Russia. Evidence from Russia is particularly relevant given that smoking prevalence is among the highest in the European Region (almost 40% of individuals smoked in 2010), and significantly higher than in the U.S.[5] We present the prevalence of smoking and drinking by gender and year in Figures A.3 and A.4 in Appendix A. These figures highlight that smoking prevalence is substantial, particularly among men, reaching nearly 60% in the pre-ban period. The prevalence for women is significantly lower (20%) but revealed a dramatic increase in the years before 2000 (Lunze and Migliorini, 2013). The gap is also significant if we look at alcohol consumption: the annual per capita consumption in 2013 was around 13.5[6] litres in Russia, while in the U.S., it was around 8.8[7]. Given our interest in the potential spillover effects of the workplace smoking ban on alcohol consumption, it is noteworthy that drinking prevalence in Russia is extremely high for both men and women. Hence, Russia appears to be an important country for examining the effect of smoking bans on smoking and other health behaviours. While the literature on the specific impact of the 2013 workplace smoking ban in Russia remains relatively limited, Gambaryan et al. (2018) suggests that the Russia's Tobacco Control Law contributed to reductions in cardiovascular disease-related hospital discharge rates (Gambaryan et al., 2018). Additionally, broader analyses of smoking prevalence trends in Russia indicate a decline in smoking rates coinciding with the implementation of tobacco control measures, particularly among men (Shkolnikov et al., 2020).

Our second contribution is to offer evidence of the effect of smoking bans on other health behaviours and its subsequent social multiplier effects (Cutler and Lleras-Muney, 2010). In Section 2, we summarize the existing literature and we describe the underpinnings of behavioural spillovers and how our paper contributes to our understanding of them.

Finally, this paper examines the effect of the WSB on different target groups. The existence of behavioural spillovers among social ties has important implications for the evaluation of the benefits of health interventions. Fletcher and Marksteiner (2017) have recently documented the first evidence of causal spillovers of health behaviours between spouses and Powell et al. (2005) reported that peer effects play a significant role in youth smoking decisions. In line with the results of Pfeifer et al. (2020), we find that smoking bans spill over to the treated person's household.

The remainder of the paper is organized as follows. The next section reports a brief summary of the status of the literature on health behaviours and behavioural spillovers. Section 3 provides a description of the data and outlines the empirical strategy. Section 4 displays the baseline estimates, and Section 5 the spillover effects on other individuals. Section 6 is devoted to the robustness checks of our estimates. A final section concludes.

2. Behavioural spillovers

Behavioural spillovers arise when changes in one behaviour give rise to changes in other behaviours. They can be driven by compen-

[3] We focus on the period between 2010 and 2014 to avoid capturing the effects of policies affecting prices in place in 2009 and 2015, and of reforms of the labour market in place in 2002 and 2010.

[4] Throughout the paper, we consider the effect on both extensive margins, defined as the probability of adopting a certain behaviour (e.g., prevalence of smoking), and intensive margins, defined as the quantity consumed by those who adopt that behaviour (e.g., consumption of cigarettes).

[5] In 2013, the smoking prevalence in the U.S. was 17.8%. Data from 'Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC".

[6] https://lenta.ru/news/2013/10/17/alcohol/.

[7] https://www.statista.com/statistics/1081880/us-alcohol-consumption-per-person-per-year/.

satory beliefs in the search for consistency in behaviour.[8] Testing the effect of such spillovers requires either a careful experimental design or a quasi-natural experiment, such as a policy intervention targeting one behaviour and then having the ability to examine the effects of the intervention on other behaviours (Thomas et al., 2016; Truelove et al., 2014).

Whether or not a change in a reference behaviour influences other healthy behaviours depends on whether such changes are substitutes or complementary in a specific environment. For instance, if behaviours are substitutes, the presence of behavioural spillovers might give rise to "licensing effects" (e.g., drink more, exercise less), which means that individuals adjust other behaviours as a result of changing some specifically targeted behaviour (smoking). Such adverse spillover effects have been identified in environmental decision-making (Nilsson et al., 2017) to explain the extent to which individuals engage in compensating behaviours (e.g., recycling) to reduce their feelings of guilt that result from engaging in non-environmentally friendly behaviours (e.g., driving). The latter set of behavioural processes is generally labelled "compensatory beliefs" that explain, in the nutrition domain, dieters' inconsistent behaviours when their goals (e.g., healthy eating) conflict with other goals (e.g., experiencing pleasure from food).

Most of the literature that investigates spillovers of tobacco policies focuses on the effect on drinking (Adams and Cotti, 2008; Picone et al., 2004; Koksal and Wohlgenant, 2016; Burton, 2020) and has not reached unambiguous conclusions.[9] Some studies have already shown that drinking complements smoking (Dee, 1999; Picone et al., 2004; Yörük and Yörük, 2011; Crost and Guerrero, 2012; Pieroni et al., 2013b; Businelle et al., 2013; Picone and Sloan, 2003). Pieroni et al. (2013a) document that the percentage of habitual drinkers of alcoholic beverages who typically consumed outside the home decreased after the ban, which is consistent with a complementary effect of alcohol intake on smoking. However, they measured the effect of smoking bans in bars and restaurants, which may differ from that of smoking bans in the workplace. In addition, their identification strategy relies on cross-sectional data where the year immediately before the introduction of the smoking ban was not available, casting doubts on the robustness of their estimated causal effects. citetpicone2004effect exploit the introduction of smoking bans in the U.S. but focus on older individuals.

Gruber and Frakes (2006) find evidence of an effect of cigarette taxes on body weight, implying that reduced smoking leads to lower body weights and similar effects are found in other studies (Baum, 2009; Liu et al., 2010; Wildman and Hollingsworth, 2012; Pieroni and Salmasi, 2015). However, more recent studies that revisit such effects find no evidence of a link between smoking and obesity (Nonnemaker et al., 2009) or heterogeneous effects (Wehby and Courtemanche, 2012; Wehby et al., 2012). In contrast, other studies document evidence of complementary behaviours. For instance, using a first difference model, French et al. (2010) find that increasing frequency and intensity of alcohol use is associated with statistically significant yet quantitatively small weight gain. One explanation for this result is the existing complementarities between health behaviours (Dragone et al., 2016).

Finally, Courtemanche (2009) examines other health behaviours influenced by smoking: physical activity and food consumption (number of grams of fat consumed per day; the number of times that fruit and vegetables are consumed per week). An explanation of these results is that individuals who are exogenously induced to smoke less (or quit altogether) may experience a renewed sense of interest in their health, such as a healthier diet and exercise. In addition, people who are able to overcome their smoking addiction may gain self-confidence and develop healthier habits (Sweet, 2000). However, their evidence does not result from a causal quasi-experimental research design.

3. Data and empirical strategy

3.1. Data

We use data from the Russian Longitudinal Monitoring Survey (RLMS),[10] which is an ongoing longitudinal survey, with the first wave in 1994. The survey collects information on a wide range of individual and household characteristics, including detailed expenditure data and information about individual activities and health for household members aged 14 and older.

Our sample includes individuals over the age of 18 and under 65 from 2010 to 2014. We exclude individuals over 65 as it is the common retirement age, and hence, WSBs would not typically affect them, as discussed in the next section.[11] We use employment status to classify individuals into treatment and control groups.[12] We restrict our analysis to the period 2010–2014 for several reasons. First, to define properly treatment and control group, we kept in the sample individuals whose employment status has not changed over the time of the analysis. Extending the time window would come at the cost of a significant decrease in sample size. Second, if we go further back in time employment status might have been influenced by the transformation of the labour market and employment reforms. Indeed, in 2002, Russia approved a reformed pension system that encompasses three types of pensions: state, compulsory occupation pension and non-state pensions. In 2002, significant reforms have taken place such as the introduction of a unified social tax and the introduction of social insurance contributions in 2010. Furthermore, this decision prevents our estimates from accounting for the impact of a minimum price for alcoholic beverages that was implemented in 2009, and we ended in 2014 as the prices of alcoholic beverages were cut considerably in 2015 to disincentivize illegal consumption of alcohol, which became extremely commonplace among Russian drinkers due to the continual increases in prices after 2009. Furthermore, after 2014 (Invasion of Ukraine) the geopolitical context might have been different, which we believe can bias the identification of the effect. Such sudden variations in alcohol prices can influence both smoking and other health behaviours beyond the introduction of smoking bans and for this reason, we decided to focus on a period of time where prices did not show important discontinuities.

[8] An explanation for behavioural spillovers is that if individuals expect to attain a specific abstract goal of "being healthy", a change in a reference health behaviour, such as smoking, might trigger the adoption of changes in other behaviours. Some authors coin this effect as the "foot in the door" effect (Bénabou and Tirole, 2011). Indeed, health identity gives rise to expectations of action, i.e., "behavioural standards" for individuals to follow, so that incoherence between expected and actual behaviours produce negative evaluative emotions (Stryker and Burke, 2000), or negative effects on self-image (Bénabou and Tirole, 2011). In contrast, identity-congruent behaviours give rise to positive emotions. In some studies in the health realm, identity has been shown to influence exercise (Anderson et al., 1998) as well as smoking and drinking (Storer et al., 1997).

[9] These papers mainly examine the effects of PPSBs in bars and restaurants since those are the places where alcohol is mostly consumed.

[10] Source: Russia Longitudinal Monitoring survey, the RLMS-HSE survey is conducted by the Higher School of Economics, National Research University in collaboration with the Carolina Population Center, University of North Carolina and the Institute of Sociology, Russian Academy of Sciences. (RLMS-HSE websites: http://www.cpc.unc.edu/projects/rlms-hse, http://www.hse.ru/org/hse/rlms)

[11] Individuals who retire during the sample period or who reach the age of 18 during the sample period are not included in the final sample.

[12] We test the robustness of the results to an alternative definition of treatment and control group based on the quartiles of the distribution of the hours worked. This definition should indeed mitigate concerns about differences between employed and unemployed. Results are presented in Tables C.1, C.2, in Appendix C. Unfortunately, there was not sufficient variation in the occupations where employees were not allowed to smoke even before the ban to use that as a definition of treatment.

Table 1
Effect of smoking bans on smoking behaviour.

	Smoker	Number of cigarettes
	Men	
	(1)	(2)
SB_{WP}	−0.0291**	−0.3650
	(0.012)	(0.359)
Constant	0.3265	3.3550
	(0.229)	(7.226)
Mean of Y	0.574	17.54
SD of Y	0.494	8.078
Observations	23,014	12,666
Number of clusters	8345	5087
	Women	
SB_{WP}	−0.0014	−0.2903
	(0.005)	(0.397)
Constant	0.4118	14.3074
	(0.259)	(12.331)
Mean of Y	0.183	11.86
SD of Y	0.386	6.651
Observations	26,246	4579
Number of clusters	9182	1955

Notes: All specifications are estimated using OLS and include individual- and year-specific fixed effects, and control for age, marital status, level of education and geographic area characteristics[a]. The table shows DiD estimates for the effect of WSBs on smoking participation and consumption. Standard errors (in parentheses) are clustered at the individual level. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.

[a] We include tables controlling for income as an additional robustness check in Appendix C. For unemployed individuals, income corresponds to the minimum wage.

Figures A.1–A.2 report descriptive evidence of price variations for tobacco products and alcoholic drinks.[13]

Indeed, they show the variation in the relative prices of cigarettes and alcoholic drinks in Russia from 2000 to 2017. Like in other countries, cigarette prices have been constantly rising since 2010. Such an increasing trend in cigarette prices could additionally lead to a reduction in smoking beyond the effect of smoking bans, but given that taxes affect both treated and controls equally, the DiD strategy followed here accounts for this effect. Indeed, the sudden increase in cigarette prices could be a threat to our specification if the demand for unemployed individuals is less elastic than the demand for employed individuals. However, it must be noted that: (i) the increase in prices started in 2009, whereas we can observe a decrease in smoking participation only after the introduction of smoking bans in 2013; (ii) in Section 6, we check the robustness of our results to the inclusion of unit values of alcohol and tobacco in the model; (iii) we check that total income shows similar dynamics in both treatment and control group.

When we turn to examining the relative prices for alcoholic beverages, we can observe two years, i.e., 2009 and 2015, where prices either increased or fell suddenly.[14] Since such sudden variations in alcohol prices could impact drinking behaviours beyond the indirect effect of smoking bans, we only include the years between 2010 and 2014, when alcohol prices remained stable. Finally, descriptive statistics for other variables of interest in our analysis are shown in Table A.1. It is worth mentioning that a limitation of the way smoking is measured does not allow us to distinguish between smoking cessation and initiation.

3.2. Empirical strategy

Our empirical strategy aims to estimate the effect of anti-smoking legislation on smoking and other health behaviours, such as drinking habits and physical exercise. More specifically, we exploit the introduction of a comprehensive tobacco control law in Russia in 2013. The policy was implemented to reduce tobacco use among Russians by: (i) banning smoking in public places, including workplaces (WSB), housing block stairwells, buses, and commuter trains and within 15 metres of train stations and airports; and (ii) requiring graphic health warnings on cigarette packs and prohibiting advertising and promotion of tobacco products and sponsorships by tobacco companies. An interesting feature of this legislation is that, although it has been in force since the 1st of June 2013, the ban on smoking in restaurants, hotels, and trains came into effect on the 1st of June 2014. One could exploit the differential implementation of bans to estimate their impact on smoking and other health behaviours, but the simple pre-post comparison may lead to biased estimates. Furthermore, there may be other factors, such as changes in cigarette and alcohol prices or the introduction of graphic health warnings that vary after 2013, that are responsible for changes in smoking and other behaviours.

In order to identify the effect and account for these confounding factors, we propose a DiD strategy that exploits both the differential implementation of smoking bans and the fact that not all smokers in the population were exposed to the same level of restrictions. We can identify a first period, including the years before 2013, when no regulation of smoking was in place, a second period from 2013 to 2014, when the first part of the law banning smoking in workplaces – excluding bars, restaurants, and trains – was implemented, and a third period, after 2014, when the ban in public places was also implemented. In addition, it is worth noting that not all smokers were equally exposed to smoking bans. In fact, employed individuals were first exposed to WSBs and then also to bans in public places, whereas unemployed individuals were exposed only to bans in public places after 2014. Defining the former (employed individuals) as the treatment group and the latter (unemployed individuals) as a control group, we exploit the different types and timings of smoking bans introduced in Russia after 2013, which allows us to estimate the effect of workplace smoking bans on smoking and on other health behaviours. Fig. 1 shows the timeline of the implementation of smoking bans in Russia and how employed and unemployed were affected in each period of time. In the first part of the chart, neither employed nor unemployed individuals were affected, while after 2013, employed individuals were exposed to smoking bans in workplaces (WP). After 2014, employed individuals are exposed to both bans in workplaces and public places (WP + PP), whereas unemployed individuals are only exposed to bans in public places.[15] In each period we can calculate the difference between the average health behaviours of employed and unemployed individuals and between employed individuals before and after the implementation of each smoking ban, which corresponds to a DiD estimator that estimates the effect of smoking bans in workplaces.

[13] We proxy prices by means of unit values that have been extensively employed in the literature, though this also embeds an average quality choice component. Unit values are estimated as the ratio between household expenditure and quantity purchased for a specific item. In addition, we obtain relative unit values by dividing absolute unit values by the unit value of total expenditure. Information about household expenditure and quantity purchased for a wide range of durable and non-durable items is provided by the RLMS survey on household expenditure for the years 2001 to 2017. This survey allows us to link information about smoking and other health behaviours to information on expenditure and quantity purchased at the household level.

[14] On 1 January 2010, the order nr. 17 of the Federal Authority for the Control of the alcohol market, dated 30 November 2009, set a minimum price of 89 roubles (about 1.50 US dollars) for a half-litre bottle of vodka in Russia. The price of vodka was subsequently increased during the following years, reaching 220 roubles (about 3 US dollars), until 2015, when it was cut by 16% as a way of reducing illegal drinking.

[15] If employed individuals have gotten used to the ban due to being exposed to the PP before the WP and have already changed their behaviour, then our estimates are a lower bound.

Table 2
Effect of smoking bans on drinking behaviour.

	Drinking		Wine		Beer	
	Participation	Consumption	Participation	Consumption	Participation	Consumption
	Men					
	(1)	(2)	(3)	(4)	(5)	(6)
SB_{WP}	−0.0673***	−0.1044**	−0.0059	−0.2081*	−0.0659***	−0.0176
	(0.016)	0.051)	(0.010)	(0.126)	(0.015)	(0.047)
Constant	−0.0154	5.5393***	−0.5063	10.4127***	0.4396	5.1195***
	(0.491)	(0.962)	(0.336)	(3.169)	(0.411)	(1.008)
Mean of \emph{Y}	0.490	6.720	0.104	5.735	0.441	6.765
SD of \emph{Y}	0.500	0.708	0.306	0.696	0.497	0.602
Observations	22,906	11,432	22,996	2454	22,928	10,303
Number of clusters	8327	5436	8342	1743	8332	4991
	Women					
SB_{WP}	−0.0346***	−0.0360	−0.0068	0.0559	−0.0340***	−0.0317
	(0.012)	(0.045)	(0.011)	(0.053)	(0.009)	(0.053)
Constant	−0.7203*	5.0087***	−1.5846***	2.7467*	1.0866***	4.9163***
	(0.435)	(1.366)	(0.460)	(1.430)	(0.393)	(1.729)
Mean of \emph{Y}	0.387	5.978	0.254	5.457	0.200	6.314
SD of \emph{Y}	0.487	0.832	0.435	0.613	0.400	0.628
Observations	26,191	10,061	26,226	6882	26,224	4894
Number of clusters	9177	5140	9179	4022	9181	2807

Notes: All specifications are estimated using OLS and include individual- and year-specific fixed effects and control for age, marital status, level of education and geographic area characteristics. The table shows DiD estimates for the effect of WSBs on drinking participation and consumption for the following categories: all, wine, and beer. Standard errors (in parentheses) are clustered at the individual level. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.

Fig. 1. Timeline of the implementation of smoking bans.
Notes: The figure plots the timeline of the implementation of smoking bans in Russia and how the employed and unemployed are affected in each period of time.

Formally, the DiD estimator can be expressed as follows:

$$Y_{it} = \alpha_1 T_i \times post_t + \sum_{j=1}^{J} \alpha_j X_{it} + l_i + m_t + \epsilon_{it}, \quad (1)$$

where Y_{it} describes our outcomes of interest and measures: (i) smoking status, in terms of participation (S_{it} = 1 if individual i at time t smokes) and intensity (S_{it} = average number of cigarettes smoked daily by individual i at time t); (ii) drinking behaviour, defined as alcohol participation (Y_{it} = 1 if individual i at time t had at least one alcoholic drink during the last month), and alcohol consumption (Y_{it} = the natural logarithm grams consumed daily for individual i at time t), noting that can distinguish consumption of wine and beer to account for possible heterogeneous effects on these categories; (iii) participation in physical activity (Y_{it} = 1 if individual i at time t participated in any physical activity during the last 12 months), and intensity (Y_{it} = number of sessions per month or minutes per session of physical activity for individual i at time t). $T_i \times post_t$ identifies the effect of the treatment, where T_i takes the value of 1 for employed individuals and 0 for unemployed individuals whose employment status never changed before or after 2013, while $post_t$ is equal to 1 after 2013,

i.e. the first year of enforcement for the WSB.[16] We include individual (l_i) and time-specific fixed effects (m_t) and a vector of covariates at the individual level, X_{it}. For detailed descriptive statistics, see Table A.1 and A.4. As the subgroups of employed and unemployed individuals may differ in important ways that could influence health behaviours independently of the WSB, our regression models include controls for observable individual characteristics, including age, income, education, and health status, to mitigate this concern. The main effect of interest is α_1, which is the coefficient that captures the causal effect of $T_i \times post_t$ on Y_{it}.

Nonetheless, for our estimates to be valid we must be able to prove that the introduction of smoking bans did not affect the probability of employment. To avoid the risk of selection into employment based on the exposure to the WSB, we only include in our analysis individuals who report always being in employment, thus giving rise to both an unbalanced and a balanced sample of individuals. The latter sample is used to ensure that individuals do not modify their employment status between interviews.

As expected, we rely on the common trend assumption to ensure the identification of causal effects.[17] We test this assumption by estimating the following equation:

$$Y_{it} = \gamma_1 + \sum_{j=2}^{J} \eta_j (Lag_j)_{it} + \sum_{k=1}^{K} \mu_k (Lead_k)_{it} + \lambda_i + \psi_t + \xi_{it}. \quad (2)$$

From Eq. (2), we can estimate an event study where η_j and μ_k are parameters associated with lags and leads, defined as in Clarke and Schythe (2020), and can be interpreted as post-ban and anticipatory effects, respectively. λ_i and ψ_t represent individual-specific and year-fixed effects. The common trend assumption can be tested for the majority of the outcomes, by proving that the coefficients of leads are not significantly different from zero, in which case we can conclude that treated and control individuals have the same pre-ban behaviour with respect to health behaviours. Moreover, we can use post-treatment coefficients (i.e., lags) to test whether the effect grows or fades as time passes.

4. Results

4.1. The panel event study

Figs. 2–3 display the lags and leads for the main health behaviours of interest estimated from Eq. (2). Fig. 2 reveals that the pre-trend assumption is met for smoking participation since all lead coefficients are not statistically different from 0, but we do observe a decrease in the probability of smoking after 2013 for employed men only, but not for employed women. No significant differences are found in the number of cigarettes smoked. Similarly, Fig. 3 indicates the common trend assumption is not violated for the majority of the outcomes. After 2013, employed men experience a decrease in the probability of drinking, especially driven by a change in the consumption of beer. The same does not occur for women. We find similar results for alcohol consumption. Indeed, Fig. 3 shows that, among men, time leads are not significantly different from zero, implying that the common trend assumption also holds for these outcomes. In addition, we find evidence of a decrease in alcohol consumption, which is driven by a decrease in wine consumption.[18] Yet, given that the common trend assumptions are generally met, with the exception of women's drinking habits, the discussion now shifts to the main findings from Eq. (1).

4.2. Main estimates

4.2.1. Effect on smoking behaviour

Tables 1–2 contain the main DiD estimation results. These estimations are retrieved from an unbalanced panel.[19] We report the results separately for men and women.[20] The main outcomes of interest are smoking behaviour, number of cigarettes, drinking participation, and drinking consumption (distinguishing between wine and beer). In addition, we report results on exercise and intensity of physical activity in Appendix B. While the first of these is the main target of the smoking ban, the others show the spillover effects of the ban on other health behaviours, which is one of the main contributions of this paper.

Estimates reveal a significant reduction in the probability of smoking among men. Table 1 (column 1) suggests that the WSB significantly reduces the percentage of smokers by 2.9 percentage points, out of an average percentage of 57.4% male smokers. We find no effect on women, whose average percentage smoking prevalence is already significantly lower (18.3%). While female smoking is not uncommon in Russia, it has historically been subject to stronger social norms and stigmas than male smoking. Prior literature suggests that smoking among women in Russia may be perceived as less socially acceptable, particularly in public or professional settings (e.g., Perlman et al. (2007), Gilmore et al. (2004)). This could mean that women were already less likely to smoke in the workplace even prior to the ban, thereby limiting the scope for behavioural change in response to the policy. Table 1 (column 2) shows that no effect is reported on the average number of cigarettes either for men (17.5) or for women (11.9). We also test if the WSB has a different impact on heavy and light smokers, defined by the number of cigarettes. Yet, as Table C.14 shows, we find no significant difference in the number of cigarettes. Overall, the WSB reduces smoking participation among men, though it does not alter the number of cigarettes smoked by those who continue to smoke.

4.2.2. Effect on other health behaviours

In Tables 2 (and Table B.1[21]) we display the results of the spillover effects of the WSB on other health behaviours. Since we do not find any effect of the WSB on smoking behaviour among women and in light of the fact that the common trend assumption is not met, we are aware of the need to be cautious in the interpretation of the results of the effect of the WSB on other health behaviours among women. We test whether a compensatory mechanism (licensing effect) is triggered whereby individuals who quit an unhealthy behaviour engage

[16] Approximately 95% of interviews in each wave are conducted between October and December. This timing is important for our identification strategy, as it implies that in each relevant survey year, the vast majority of individuals were surveyed after the implementation of the policy introduced earlier that year (June). We therefore interpret individuals surveyed in these years as being post-treatment.

[17] In other words, if there were not a smoking ban after 2013, health behaviours for employed individuals would have faced the same change as for unemployed ones.

[18] Figure B.1, in Appendix B, shows the case-event study for physical activity. From these graphs, we observe that there is evidence of a common trend before 2013 for both men and women, and we find evidence of a significant increase in the probability of participating in exercise for both men and women but not for other variables measuring physical activity intensity.

[19] There are approximately 50,000 observations in the sample, and in each regression, the following control variables are included: gender, age, age squared, education and marital status. As a robustness check, we also control for income in Tables C.4-C.5 in Appendix C.

[20] Smoking is a heavily male-skewed activity in Russia, while female smoking prevalence had far lower rates of smoking compared to their counterparts in most Western countries. Indeed, 60 percent of men smoked whilst barely 17 percent of women in 2009, and while the prevalence of female smokers has not been altered a decade after that of men declined by 10 percentile points in 2020 (Quirmbach and Gerry, 2016). Hence, we expect the effect of smoking bans to differ across genders.

[21] Since we do not find any significant effect of the WSB on physical activity, we report results on those outcomes in Appendix B.

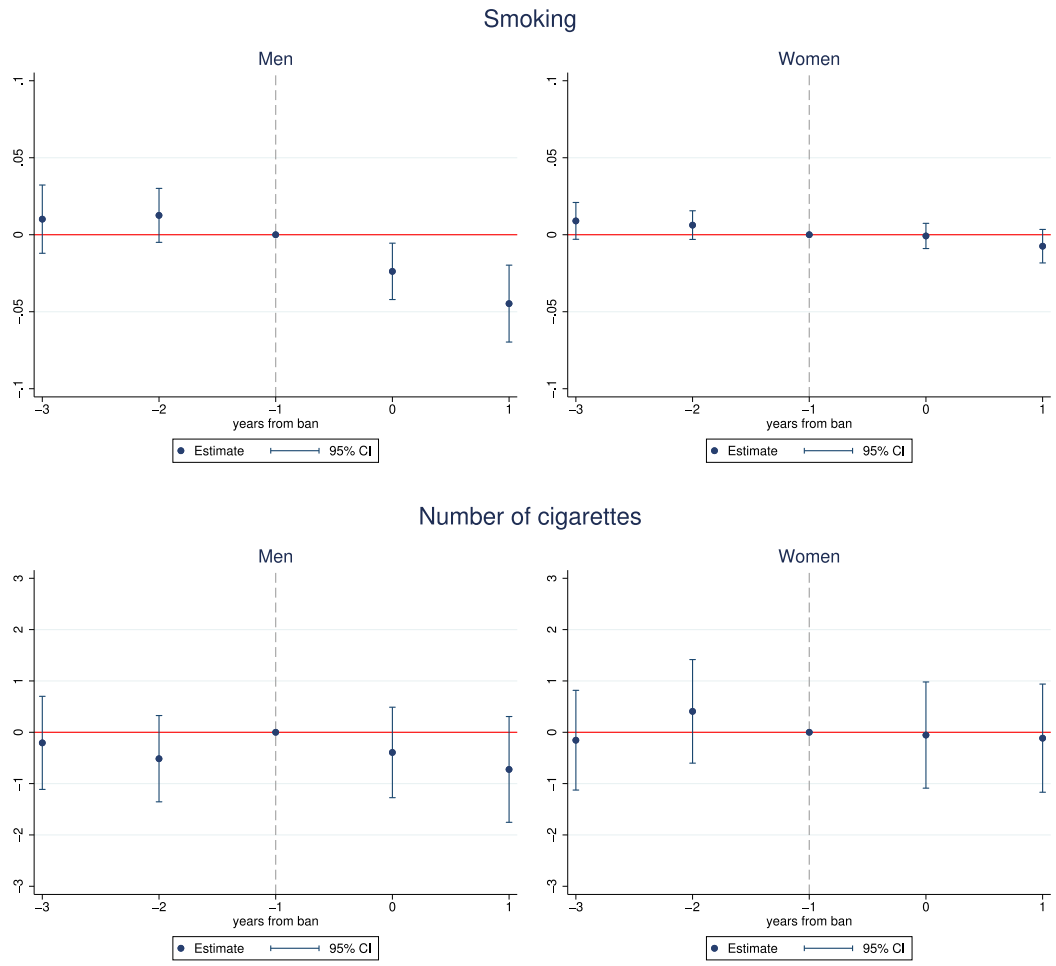

Fig. 2. Event study: smoking and number of cigarettes.
Notes: The figure plots lags and leads for the main health behaviours estimated from Eq. (2). The dots represent point estimates, and vertical bars represent 95% confidence intervals. The year 2012 was chosen as the reference year.

in another one. Alternatively, it might well be that WSB give rise to a complementary effect, increasing the awareness of the welfare effects of a healthy lifestyle. Consistently with the presence of behavioural spillover effects, Table 2 shows the estimated coefficients of the WSB on the use of various types of alcoholic beverages. We find that the WSB decreases alcohol use by 6.7 percentage points, out of 49% of men who were drinkers, and by 3.5 percentage points, out of 39% of women were drinkers. Focusing on drinking categories (columns 3–6), we find significant and negative effects of the WSB on beer consumption, and no effect on wine for both men and women. Estimates suggest that the negative impact of the WSB on drinking is driven by reduced beer drinking. The effect on alcohol use is confirmed when examining alcohol consumption (columns 2, 4 and 6), measured by average grams of alcohol consumed. More specifically, column 2 shows that the smoking ban reduces the grams of alcohol consumed per capita by 10.4%. Yet, the specific WSB effect on the consumption of each type of alcoholic beverage is different from the effect on participation. Indeed, the ban has a significant effect on reducing the consumption of wine but not beer. Our explanation for the different effects of the WSB on beer and wine is based on the fact that they have different prices and different prevalence in our sample. More specifically, the beer unit price is lower than the wine unit price, as shown by Figure A.2. Indeed, wine is imported and commonly regarded as a luxury good compared to beer, and its consumed by a smaller share of the population (approx. 10% for wine and approx. 44% for beer, as shown in Table 2). If the ban effect spills over to drinking consumption, we expect it to give rise to a reduction in consumption of wine since demand is less elastic and individuals would rather drink less than quit it.

When we adjust inference for multiple hypothesis testing, we find that the Romano–Wolf *p*-values confirm the significance of the results on the main outcomes (Table C.16).

Table B.1 shows estimates of WSB when participation in or intensity of physical activity are considered as outcomes. The main estimates show no effect of the smoking ban on participation in physical activity, on the number of sessions per week or on the minutes per session of physical activity. We find a significant effect when we look specifically at spillovers inside the household, which are presented in Section 5.

4.3. Heterogeneous effects

WSB may have different effects according to some observable characteristics of respondents, like age, education, status of residency, and family type. In theory, it should be easier for young adults to quit smoking due to their potentially lower levels of addiction and fewer years living with tobacco use as a regular part of their daily lives (Husten, 2007). Highly educated individuals should be more likely to understand the benefits of quitting; indeed, several studies provide evidence of an association between education and both willingness to quit smoking (Djikanovic et al., 2013) and actual smoking cessation (Ruokolainen et al., 2021). Previous evidence has also reported that the incidence of smoking is affected by marital status (Ramsey et al., 2019) and that there is a disparity in smoking prevalence between rural and urban areas (Doogan et al., 2017). For this reason, investigating whether these

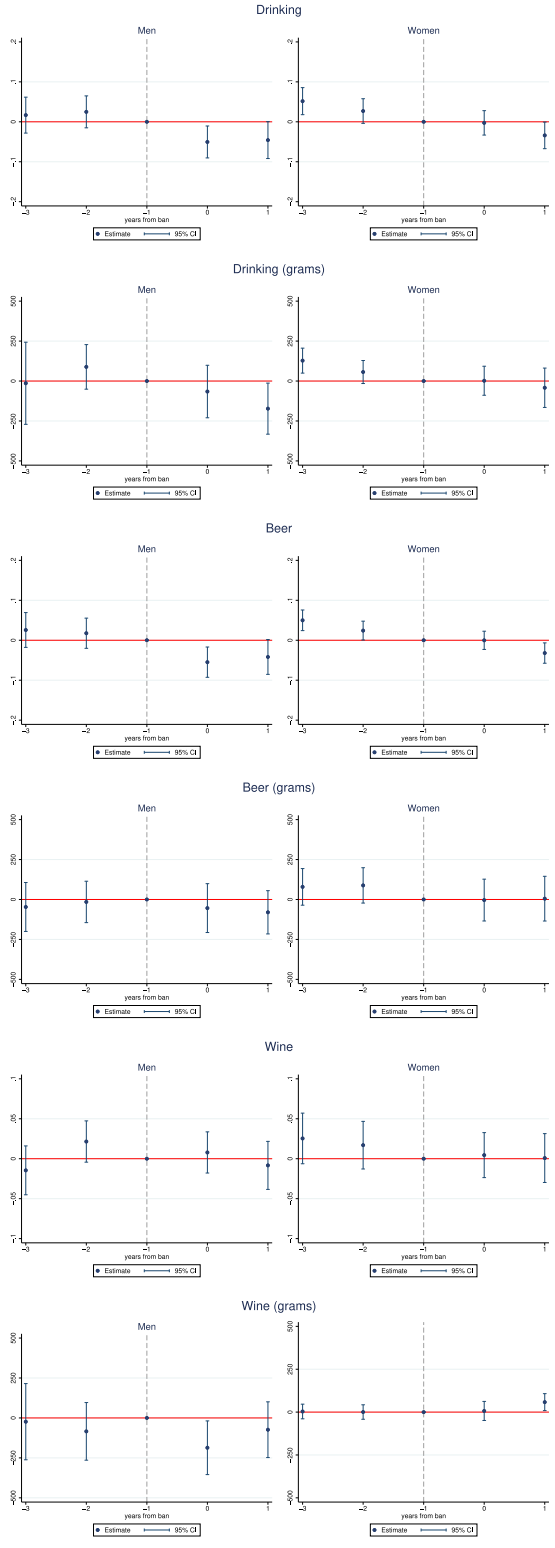

Fig. 3. Event study: drinking participation and consumption.

dimensions of heterogeneity are salient in determining differences in the impact of the WSB might be of interest to the scope of this analysis.

To explore potential heterogeneity in the effects of the workplace smoking ban, we interact the DiD indicator (Treated × Post) with dummy variables for each category of the relevant subgroup characteristics, namely, age, education level, residency status, and family type, within the full sample. This allows us to estimate differential effects across subpopulations while maintaining a consistent regression framework. We report heterogeneous effects on four categories: age, education, status of residency, and family type.[22] Heterogeneous effects on smoking are shown in Fig. 4.

The estimates suggest that the positive effect of the WSB in reducing the incidence of smoking is evenly spread among age groups. Indeed, Fig. 4 shows that the WSB has no significant additional effect on people older than 30; it reduces the percentage of smokers among individuals younger than 30 by 0.0328 percentage points. Among the oldest age group, the WSB does not reduce the percentage of smokers, but it decreases the number of cigarettes per capita (−1.13 cigarettes in the age class 50–64 for men). We document no effect on smoking behaviour in women, supporting the previously reported null effect in the main estimates.

Turning to other heterogeneity dimensions, we observe that the effect of the WSB is homogeneous across education groups and that it reduces the percentage of smokers among those who live in a town. We do not observe remarkable heterogeneous effects for the number of cigarettes smoked regardless of gender and family size.[23]

5. Spillover effects on quitters and on other household members

Our baseline estimates suggest that the effect of the WSB leads to larger changes in drinking than in smoking behaviours. Tables 1 and 2 suggest that smoking declines by 2.9 percentage points among men, whereas drinking participation decreases by 6.7 and 3.5 percentage points among men and women, respectively. This result can be explained by the presence of spillover effects on the drinking behaviours of peers of individuals reacting to the workplace ban. In other words, smoking bans influence alcohol use of the peers of those who quit smoking after a WSB.[24] However, we define individuals as 'potentially' indirectly treated if they live in the same household as compliers (those who quit after the ban) and can either be: (i)compliers as well, (ii) never smokers or (ii) current smokers, and we estimate the variation in drinking and physical activity for these individuals and also for compliers compared to that of individuals not living with a complier. We use the following equation:

$$Y_{it}^{g} = \iota_1 T_{it}^{g} \times post_t + \sum_{j=1}^{J} \iota_j X_{it} + l_i + m_t + \epsilon_{it} \quad (3)$$

where Y_{it}^{g} describes our outcomes of interest in drinking and physical activity already described in previous sections. T_{it}^{g} is the treatment indicator, with $g = 1, 2, 3$, denoting three mutually exclusive groups: (i) compliers — individuals who quit smoking after the implementation of the policy (WSB); or (ii) never smokers and (iii) current smokers

[22] We split the sample into three age subgroups, namely individuals aged 18 to 29 years, 30 to 49 years, and 50 to 64 years. The reference age is 18–29, and the coefficients plotted in Fig. 4 represent the additional effect of belonging to one of the other age groups with respect to the reference age group. Similarly, we consider a number of education groups, with the reference group being those people who have only completed primary school. The other educational groups are completion of secondary school, vocational school, university, and postgraduate education. The reference category for spatial heterogeneity is people who live in a regional centre. Other categories are the following: towns, villages, and rural areas. As for the civil status, we distinguish between single people, people who are married or live together (family type I), and those who are divorced and not remarried, widower or widow, or married but not living together (family type II).

[23] The investigation of heterogeneous effects on other behaviours did not yield any remarkable results, so it is omitted.

[24] Unfortunately, we do not have information about respondents' peers from the RLMS, and the only analysis we can carry out in this context is within the household.

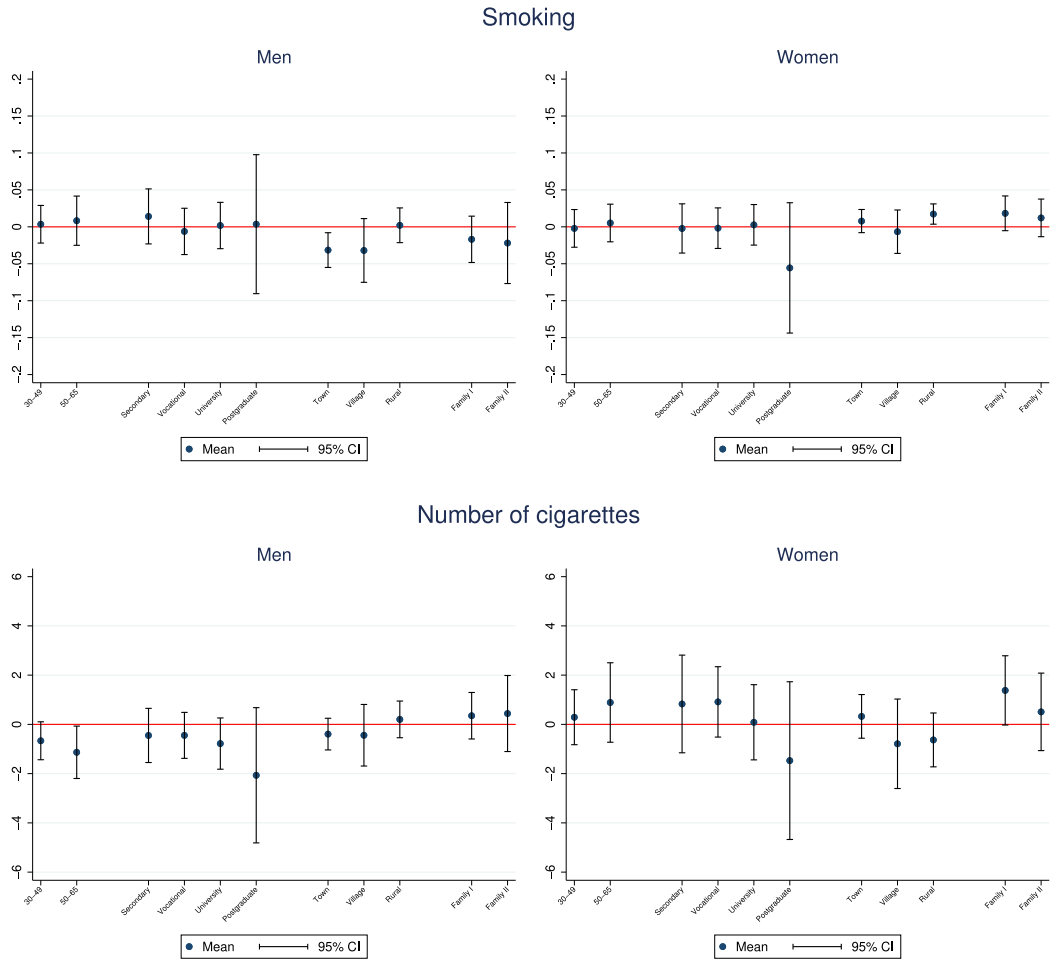

Fig. 4. Heterogeneity: smoking participation and consumption.
Notes: The figure plots heterogeneous effects of the smoking ban on smoking participation and consumption considering the following heterogeneity dimensions: age, education, residence status, and family type.

who live in a household with at least one complier.[25] The variable T_{it}^{g} takes the value 1 for individuals in any of these three groups, and 0 for individuals who do not live with a complier and are not compliers themselves. This structure allows us to examine both direct effects (on compliers) and spillover effects (on other household members).

Living in a household with a member quitting because he was exposed to the WSB represents an exogenous variation in terms of household smoking exposure for people who are not directly affected by the ban and allows us to estimate behavioural spillovers.[26] If the behavioural spillover hypothesis was validated, we should identify that: (i) compliers should have larger variations in terms of other health behaviours than non-compliers, and (ii) non-compliers living in the same household as at least one complier should change their health behaviours as well.

Fig. 5 displays the results from this analysis. In the first two graphs of the figure, we find that the effect of the WSB on the percentage of people who drink alcohol is driven by the effect on compliers, among both men and women. This is particularly true for beer, which is the product on which the main estimates showed the greatest effect.

However, we find a reduction in beer drinking for women who never smoked. These individuals were only exposed to the ban because they live in the same household as a complier.

Looking at alcohol consumption measured as grams of alcohol, the figure reveals an interesting result on drinking consumption. Men who have never smoked and live with a complier decrease the grams of wine consumed. It is, therefore, plausible that the WSB has affected not only drinking in targeted individuals but also wine consumption of people cohabiting with individuals who have managed to quit smoking after the WSB. Finally, we examine the effect of the WSB on both the participation in and the intensity of physical activity (Figure B.2). In contrast to the main estimates, we find a positive significant impact on compliers as well as a positive impact among individuals who do not smoke but live with a complier among men. Such a significant effect is found on the probability of exercising, while no effect is detected for the frequency and length of their exercise sessions.

We can conclude from Fig. 5 that limiting the analysis of the effects of smoking bans to the individuals directly targeted underestimates the effect of the WSB. Furthermore, it is worth noting that our estimates are a lower bound of the effect because our analysis is limited to peers within the same household as compliers, so it ignores all the other individuals in the same social network as compliers who are potentially indirectly affected by the ban.

[25] Sample sizes of the groups are: (i) only quitters: 783; (ii) never smokers living with a quitter: 492; (iii) current smokers living with a quitter: 446; control group of current/never smokers not living with quitter: 15,905.

[26] However, we are aware of the limitations of this analysis, for instance, not considering other channels such as friends or coworkers. So, we interpret our parameters not as causal but as correlations suggesting possible evidence of household spillovers in drinking habits and physical exercise.

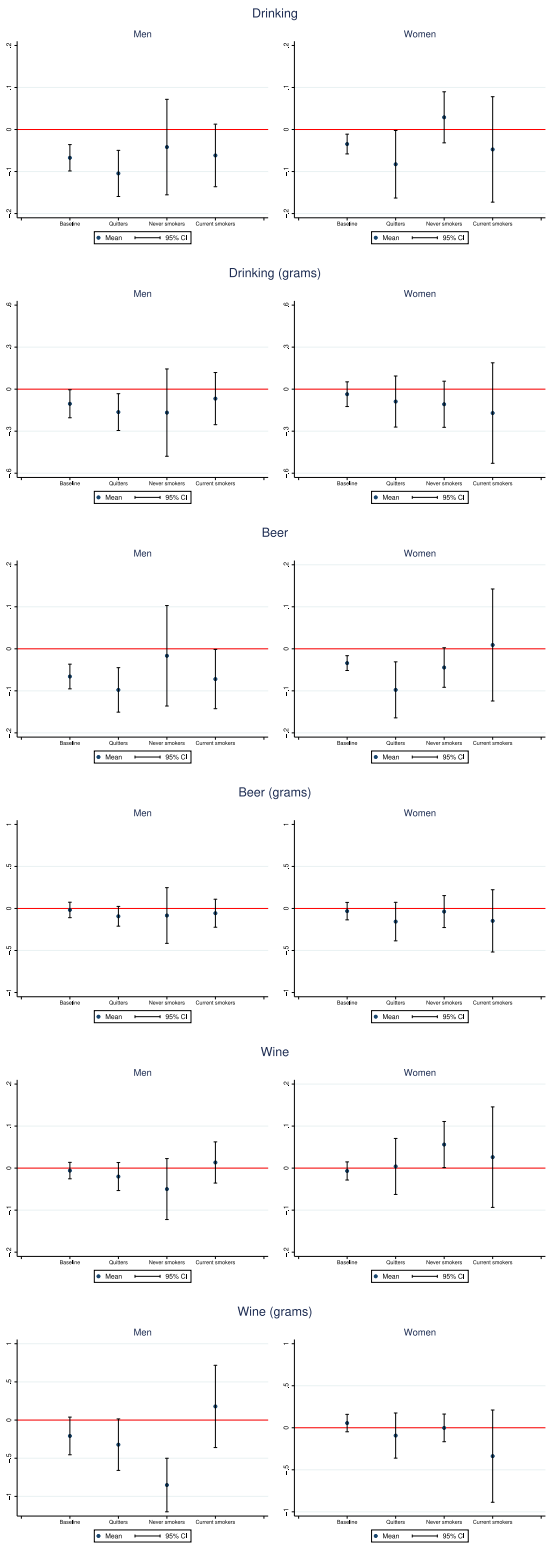

Fig. 5. Drinking: spillover effects on quitters and on other never and current smokers' household members.
Notes: The figure plots estimates from Eq. (3) of spillover effects of the workplace smoking ban on drinking participation and consumption.

6. Robustness

In this section, we document the results of a battery of robustness checks to test the sensitivity of our results with respect to the definition of the sample or the inclusion of key variables in the model.

First, we check the robustness of our results restricted to a balanced sample. The unbalanced sample might contain some individuals who might have changed their employment status when not interviewed. When we only consider individuals in the balanced sample we find that the magnitudes of the effects of the WSB on smoking are larger than the effects in the unbalanced sample (column 1, Table C.6). The coefficients of drinking participation (Table C.7) are consistent with those obtained for the unbalanced sample. However, estimates on the balanced sample do not reveal any effect on grams of alcohol consumed. This might be due to measurement errors. Consistent with our baseline results, we do not find any significant effects on other outcomes.

Second, we test whether our results are robust when we exclude individuals who begin smoking during the observation period. In the main estimates, the observed reduction in the percentage of smokers may reflect both a decrease in smoking initiation and an increase in smoking cessation. To isolate the impact of the WSB on cessation only, we restrict the sample to individuals who exhibit a change in smoking behaviour over time, as they quit smoking. By focusing on this subsample, as reported in Table C.8–C.9, we find results that are consistent with our main estimates, suggesting that the WSB has a significant effect on promoting smoking cessation.

Third, we look at the effect of the WSB on smoking consumption and drinking participation only for smokers. Employed and unemployed individuals who smoke might have a more similar price elasticity of cigarettes and alcohol, thus allowing us to estimate more accurately the treatment effect. While economic conditions may generally make unemployed individuals more price-sensitive, existing research suggests that among active smokers — particularly those with established habits — differences in price elasticity by employment status may be limited. This is likely due to the inelastic nature of demand for addictive goods like cigarettes (Chaloupka and Warner, 2000; Gruber and Köszegi, 2001; Colman and Remler, 2008). Table C.15 reports the estimates.

Fourth, we have checked whether our results change when we include regional linear trends in the model; see Tables C.10–C.11. By regional linear trends, we refer to region-specific time trends — implemented as region-by-year interaction terms — that allow us to account for systematic differences in the evolution of outcomes across regions, such as local variations in prices, policy enforcement, or other unobservables. The main results on smoking and drinking remain robust to this specification, and the reduction in the quantity of alcohol consumed is also confirmed (column 4, Table C.11).

Fifth, we provide evidence of how robust our results are to the inclusion of unit values of alcohol and tobacco in the model. This allows us to check whether the results could be biased due to changes in relative prices rather than the effect of the ban (Tables C.12–C.13).

Sixth, we test whether the WSB exerts heterogeneous effects based on the number of hours worked and the frequency of eating in a restaurant or at home. First, we check whether individuals were more likely to work more than eight hours a day and to eat out after the introduction of the smoking ban for the treated group (Figure D.1 in Appendix D). Once we show this, we test whether the introduction of the WSB exerted a larger effect among those more exposed to it and show that treated individuals exposed to the ban for longer hours have the strongest decrease in smoking (Figure D.2) and alcohol consumption (Figure D.3). Eating out reduces the effect of the WSB on drinking (Figure D.3): this is consistent with the fact that eating out offers people an incentive to drink alcohol, which counterbalances the reduction obtained by the ban.

In addition, in Figure D.4, we checked that the trend of the probability of being employed (for men and women) has not been affected by the WSB: this is particularly important to support our identification strategy in which the employment status determines the treatment and control groups. In addition, we checked the same for two placebo outcomes (Figure D.5): the probability of being single, the unit value of tobacco and the unit value of alcohol. As a final check, we account for the hypothetical violation of common trends. We adopt the relative

magnitude approach, suggested by Rambachan and Roth (2023), that allows us to identify the maximum allowed percentage deviation in the parallel trend that still allows us to estimate a significant treatment effect. We show these results in Figure D.6 for the outcomes for which we identified significant effects from baseline DiD estimates. The red bar represents the 95% CI of our baseline estimates, admitting a 0% violation in the parallel trend assumptions, blue lines represent the 95% CI of the estimated treatment effect, admitting increasing deviations from parallel trends (from 10% to 50%). Focusing on Men, we identify that the maximum allowed deviation from the parallel trend assumption is between 20% and 30% for smoking, between 30% and 40% for drinking, between 20% and 30% for wine consumption and between 30% and 40% for beer. Instead, for women it seems that the parallel trend assumption does not hold, which limits the interpretation of our estimates to men alone.

7. Conclusion

Although work-based smoking bans (WSB) have been incepted in several countries to encourage smoking cessation, they can also have spillover effects on other health behaviours. However, such spillover effects are not always included in the evaluations of smoking bans. This paper consistently documents that a WSB not only discourage smoking but can also give rise to behavioural spillovers by modifying other related behaviours, such as alcohol use and physical activity. Furthermore, we document evidence of other spillovers, namely effects beyond targeted groups, such as non-smokers and current smokers who live with a quitter, are likely to change their health behaviours, too.

Our estimates draw on a major WSB introduced between 2013 and 2014 in Russia that has been heavily enforced, and indeed, it received a high compliance rating by the WHO (WHO, 2017).[27] Russia is an interesting case to look at since it has one of the highest smoking rates in the world, with around 40% of its population smokers, alongside alcohol consumption. According to a 2011 report by the World Health Organization, annual per-capita consumption of alcohol in Russia was about 15.76 litres of pure alcohol, the fourth-highest volume in Europe.[28] Furthermore, Russia exhibited one of the largest gender differences in smoking in the world before the ban. Although on average, about half of the population smokes, smoking prevalence is estimated to be 60 per cent among men before the ban, which compares to barely 18 per cent among women.

We document robust evidence that the WSB reduces smoking among men by 2.9 percentage points. In contrast to previous studies, we only find an effect on the extensive margin. Indeed, both Evans et al. (1999) and Fichtenberg and Glantz (2000) report a reduction in the prevalence of smoking after the introduction of WSBs in the United States, Australia, Canada, and Germany, ranging from 3.8 to 5%. We find that the WSB reduces the use of alcohol (6.7 percentage point reduction among men and 3.5 percentage points among women), as well as alcohol consumption (by 10 per cent among men). In contrast, we do not observe any direct effect on individual physical activity.

Our estimates are consistent with the evidence in the literature, suggesting that smoking bans influence alcohol use, but unlike the previous literature which draws on bans in public places this paper explores evidence form bans in the workplace.[29] It is important to note that these results are relevant for policy as they suggest that studies that estimate the effects of smoking bans on smoking alone are likely to underestimate the health-related effects as they tend to disregard the presence of behavioural spillovers that alter healthy identities. Our results can be explained by either change in health-related identities (which are adjusted after marginal changes in the acceptability of related health behaviours), or licensing effects. More specifically, they point towards a joint formation of healthy behaviours.

This study has several limitations that should be acknowledged. First, there is potential measurement error in our treatment variable: while the workplace smoking ban (WSB) was implemented nationwide and prohibited indoor smoking without exceptions for designated areas, we lack data on actual compliance at the workplace level. Some employers may have voluntarily adopted restrictions prior to the law, while others may have only partially complied post-implementation. Such measurement error likely biases our estimates toward zero, meaning the observed effects may underestimate the true impact of the policy. Second, while we document a reduction in smoking prevalence, our main specification does not allow us to fully disentangle whether the decline is driven more by reductions in smoking initiation or by increased cessation. Although we attempt to isolate the effect on cessation through a robustness check, limitations in the data prevent a more granular analysis of the mechanisms. Third, the lack of data on individuals' exposure to other components of the broader tobacco control law makes it difficult to isolate the WSB effect from concurrent policy changes. Fourth, as with all observational studies, unobserved confounding factors may still influence our results, even after controlling for observable characteristics and time trends. Finally, it is worth noting that smoking bans might exhibit heterogeneous effects depending on broader social norms and the prevailing smoking and drinking culture. Moreover, the impact of workplace smoking bans may differ from that of other types of smoking restrictions, such as those implemented in public spaces or hospitality venues. We encourage future research to further explore these heterogeneities and validate the generalizability of our findings across different contexts.

CRediT authorship contribution statement

Joan Costa-Font: Methodology, Data curation, Writing – original draft, Software, Investigation, Conceptualization, Visualization, Resources, Formal analysis, Writing – review & editing, Validation, Project administration. **Luca Salmasi:** Software, Conceptualization, Writing – original draft, Resources, Investigation, Writing – review & editing, Validation, Methodology, Data curation, Visualization, Project administration, Formal analysis. **Sarah Zaccagni:** Writing – original draft, Methodology, Data curation, Visualization, Resources, Formal analysis, Conceptualization, Writing – review & editing, Software, Investigation, Validation, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.ehb.2025.101512.

[27] The law was being implemented with over 90% compliance by the restaurants/hospitality industry (see press article in Bloomberg press from 2016 Link).

[28] WHO (2011). [Russians and alcohol] World Health Organization, Geneva.

[29] Adams and Cotti (2008) observe an increase in fatal accidents involving alcohol following bans on smoking in bars, but Bernat et al. (2013) documents no evidence of smoke-free laws on alcohol-related car crash fatalities. Among studies that focus on expenditure and consumption, Pryce (2019) documents evidence that smoking bans in the UK decrease alcohol expenditure in pubs and restaurants, especially amongst smoking households. Picone et al. (2004) report a reduction in alcohol consumption among females after the introduction of smoking bans in the US, Koksal and Wohlgenant (2016) distinguish between alcohol consumption at home and in restaurants, finding a reduction of the former and an increase in the latter. In addition, we find that smoking bans affect individuals who are unaffected by the reform, namely never smokers or smokers who do not quit but live in a household with other smokers.

Data availability

Data are publicly available.

References

Adams, S., Cotti, C., 2008. Drunk driving after the passage of smoking bans in bars. J. Public Econ. 92 (5–6), 1288–1305.

Adda, J., Cornaglia, F., 2010. The effect of bans and taxes on passive smoking. Am. Econ. J.: Appl. Econ. 2 (1), 1–32.

Anderson, D.F., Cychosz, C.M., Franke, W.D., 1998. Association of exercise identity with measures of exercise commitment and physiological indicators of fitness in a law enforcement cohort. J. Sport. Behav. 21 (3), 233–241.

Anger, S., Kvasnicka, M., Siedler, T., 2011. One last puff? Public smoking bans and smoking behavior. J. Heal. Econ. 30 (3), 591–601.

Baum, C.L., 2009. The effects of cigarette costs on BMI and obesity. Heal. Econ. 18 (1), 3–19.

Becker, G.S., Grossman, M., Murphy, K.M., 1994. An empirical analysis of cigarette addiction. Am. Econ. Rev. 84, 396–418.

Bénabou, R., Tirole, J., 2011. Identity, morals, and taboos: Beliefs as assets. Q. J. Econ. 126 (2), 805–855.

Bernat, D.H., Maldonado-Molina, M., Hyland, A., Wagenaar, A.C., 2013. Effects of smoke-free laws on alcohol-related car crashes in California and New York: time series analyses from 1982 to 2008. Am. J. Public Health 103 (2), 214–220.

Boes, S., Marti, J., Maclean, J., 2015. The impact of smoking bans on smoking and consumer behavior: Quasi-experimental evidence from Switzerland. Heal. Econ. 24 (11), 1502–1516.

Burton, A., 2020. The impact of smoking bans in bars and restaurants on alcohol consumption, smoking, and alcohol-related externalities. Available at tobaccopolicy.org.

Businelle, M.S., Lam, C.Y., Kendzor, D.E., Cofta-Woerpel, L., McClure, J.B., Cinciripini, P.M., Wetter, D.W., 2013. Alcohol consumption and urges to smoke among women during a smoking cessation attempt. Exp. Clin. Psychopharmacol. 21 (1), 1–18.

Carpenter, C.S., 2009. The effects of local workplace smoking laws on smoking restrictions and exposure to smoke at work. J. Hum. Resour. 44 (4), 1023–1046.

Carpenter, C., Cook, P.J., 2008. Cigarette taxes and youth smoking: new evidence from national, state, and local Youth Risk Behavior Surveys. J. Heal. Econ. 27 (2), 287–299.

Carpenter, C., Postolek, S., Warman, C., 2011. Public-place smoking laws and exposure to environmental tobacco smoke (ETS). Am. Econ. J.: Econ. Policy 3 (3), 35–61.

Chaloupka, F.J., Grossman, M., 1996. Price, Tobacco Control Policies and Youth Smoking. NBER Working Papers 5740, National Bureau of Economic Research, Inc.

Chaloupka, F.J., Warner, K.E., 2000. The economics of smoking. Handb. Heal. Econ. 1, 1539–1627.

Clarke, D., Schythe, K.T., 2020. Implementing the Panel Event Study. IZA Discussion Papers 1352, Institute of Labor Economics (IZA), URL https://ideas.repec.org/p/iza/izadps/dp13524.html.

Colman, G.J., Remler, D.K., 2008. Vertical equity consequences of very high cigarette tax increases: if the poor are the ones smoking, how could cigarette tax increases be progressive? J. Policy Anal. Manag.: J. Assoc. Public Policy Anal. Manag. 27 (2), 376–400.

Courtemanche, C., 2009. Rising cigarette prices and rising obesity: Coincidence or unintended consequence? J. Heal. Econ. 28 (4), 781–798.

Crost, B., Guerrero, S., 2012. The effect of alcohol availability on marijuana use: Evidence from the minimum legal drinking age. J. Heal. Econ. 31 (1), 112–121.

Cutler, D.M., Lleras-Muney, A., 2010. Understanding differences in health behaviors by education. J. Heal. Econ. 29 (1), 1–28.

Dee, T.S., 1999. The complementarity of teen smoking and drinking. J. Heal. Econ. 18 (6), 769–793.

Djikanovic, B., Vukovic, D., Djikanovic, S., 2013. Inequalities in intentions to quit smoking in Serbia: data from 2006 National Health Survey. Public Health 127 (6), 521–529.

Doogan, N., Roberts, M., Wewers, M., Stanton, C., Keith, D., Gaalema, D., Kurti, A., Redner, R., Cepeda-Benito, A., Bunn, J., et al., 2017. A growing geographic disparity: rural and urban cigarette smoking trends in the United States. Prev. Med. 104, 79–85.

Dragone, D., Manaresi, F., Savorelli, L., 2016. Obesity and smoking: Can we kill two birds with one tax? Heal. Econ. 25 (11), 1464–1482.

Evans, W.N., Farrelly, M.C., Montgomery, E., 1999. Do workplace smoking bans reduce smoking? Am. Econ. Rev. 89 (4), 728–747.

Fichtenberg, C.M., Glantz, S.A., 2000. Association of the California tobacco control program with declines in cigarette consumption and mortality from heart disease. New Engl. J. Med. 46 (343), 1772–1777.

Fletcher, J., Marksteiner, R., 2017. Causal spousal health spillover effects and implications for program evaluation. Am. Econ. J.: Econ. Policy 9 (4), 144–166.

French, M.T., Norton, E.C., Fang, H., Maclean, J.C., 2010. Alcohol consumption and body weight. Heal. Econ. 19 (7), 814–832.

Gambaryan, M., Reeves, A., Deev, A., Popovich, M., Drapkina, O., Snell, A., Stuckler, D., Mauer-Stender, K., Mikkelsen, B., Boytsov, S., 2018. Effects of tobacco control policy on cardiovascular morbidity and mortality in Russia. Eur. J. Pub. Health 28 (suppl_2), 14–16.

Gilmore, A., Pomerleau, J., McKee, M., Rose, R., Haerpfer, C.W., Rotman, D., Tumanov, S., 2004. Prevalence of smoking in 8 countries of the former Soviet Union: results from the living conditions, lifestyles and health study. Am. J. Public Health 94 (12), 2177–2187.

Gruber, J., Frakes, M., 2006. Does falling smoking lead to rising obesity? J. Heal. Econ. 25 (2), 183–197.

Gruber, J., Köszegi, B., 2001. Is addiction "rational"? Theory and evidence. Q. J. Econ. 116 (4), 1261–1303.

Gruber, J., Zinman, J., 2001. Youth smoking in the United States: evidence and implications. In: Risky Behavior Among Youths: An Economic Analysis. University of Chicago Press, pp. 69–120.

Hansen, B., Sabia, J.J., Rees, D.I., 2017. Have cigarette taxes lost their bite? New estimates of the relationship between cigarette taxes and youth smoking. Am. J. Heal. Econ. 3 (1), 60–75.

Husten, C.G., 2007. Smoking cessation in young adults. Am. J. Public Health 97 (8), 1354–1356.

Jiménez-Ruiz, C.A., Miranda, J.A.R., Hurt, R.D., Pinedo, A.R., Reina, S.S., Valero, F.C., 2008. Study of the impact of laws regulating tobacco consumption on the prevalence of passive smoking in Spain. Eur. J. Public Heal. 18 (6), 622–625.

Jones, A.M., Laporte, A., Rice, N., Zucchelli, E., 2015. Do public smoking bans have an impact on active smoking? Evidence from the UK. Heal. Econ. 24 (2), 175–192.

Koksal, A., Wohlgenant, M.K., 2016. How do smoking bans in restaurants affect restaurant and at-home alcohol consumption? Empir. Econ. 50 (4), 1193–1213.

Kvasnicka, M., 2010. Public smoking bans, youth access laws, and cigarette sales at vending machines. Ruhr Economic Paper No. 173.

Liu, F., Zhang, N., Cheng, K.-W., Wang, H., 2010. Reduced smoking and rising obesity: Does smoking ban in the workplace matter? Econom. Lett. 108 (3), 249–252.

Lunze, K., Migliorini, L., 2013. Tobacco control in the Russian federation-a policy analysis. BMC Public Health 13 (1), 1–11.

Nilsson, A., Bergquist, M., Schultz, W.P., 2017. Spillover effects in environmental behaviors, across time and context: A review and research agenda. Environ. Educ. Res. 23 (4), 573–589.

Nonnemaker, J., Finkelstein, E., Engelen, M., Hoerger, T., Farrelly, M., 2009. Have efforts to reduce smoking really contributed to the obesity epidemic? Econ. Inq. 47 (2), 366–376.

Perlman, F., Bobak, M., Gilmore, A., McKee, M., 2007. Trends in the prevalence of smoking in Russia during the transition to a market economy. Tob. Control. 16 (5), 299–305.

Pfeifer, G., Reutter, M., Strohmaier, K., 2020. Goodbye smokers' corner health effects of school smoking bans. J. Hum. Resour. 55 (3), 1068–1104.

Picone, G., Sloan, F., 2003. Smoking cessation and lifestyle changes. In: Forum for Health Economics & Policy, vol. 6, (1), De Gruyter.

Picone, G.A., Sloan, F., Trogdon, J.G., 2004. The effect of the tobacco settlement and smoking bans on alcohol consumption. Heal. Econ. 13 (10), 1063–1080.

Pieroni, L., Chiavarini, M., Minelli, L., Salmasi, L., 2013a. The role of anti-smoking legislation on cigarette and alcohol consumption habits in Italy. Heal. Policy 111 (2), 116–126.

Pieroni, L., Lanari, D., Salmasi, L., 2013b. Food prices and overweight patterns in Italy. Eur. J. Heal. Econ. 14 (1), 133–151.

Pieroni, L., Salmasi, L., 2015. Does cigarette smoking affect body weight? Causal estimates from the clean indoor air law discontinuity. Economica 82, 671–704.

Powell, L.M., Tauras, J.A., Ross, H., 2005. The importance of peer effects, cigarette prices and tobacco control policies for youth smoking behavior. J. Heal. Econ. 24 (5), 950–968.

Pryce, R., 2019. The effect of the United Kingdom smoking ban on alcohol spending: Evidence from the Living Costs and Food Survey. Heal. Policy 123 (10), 936–940.

Quirmbach, D., Gerry, C.J., 2016. Gender, education and Russia's tobacco epidemic: a life-course approach. Soc. Sci. Med. 160, 54–66.

Rambachan, A., Roth, J., 2023. A more credible approach to parallel trends. Rev. Econ. Stud. 90 (5), 2555–2591.

Ramsey, Jr., M.W., Chen-Sankey, J.C., Reese-Smith, J., Choi, K., 2019. Association between marital status and cigarette smoking: Variation by race and ethnicity. Prev. Med. 119, 48–51.

Rong, Z., 2017. The impact of public smoking bans on smoking behaviour: Evidence from an Australian experiment. B. E. J. Econ. Anal. & Policy 17 (4), 1–6.

Ruokolainen, O., Härkänen, T., Lahti, J., Haukkala, A., Heliövaara, M., Rahkonen, O., 2021. Association between educational level and smoking cessation in an 11-year follow-up study of a national health survey. Scand. J. Public Heal. 49 (8), 951–960.

Shkolnikov, V.M., Churilova, E., Jdanov, D.A., Shalnova, S.A., Nilssen, O., Kudryavtsev, A., Cook, S., Malyutina, S., McKee, M., Leon, D.A., 2020. Time trends in smoking in Russia in the light of recent tobacco control measures: synthesis of evidence from multiple sources. BMC Public Health 20, 1–11.

Storer, J.H., Cychosz, C.M., Anderson, D.F., 1997. Wellness behaviors, social identities, and health promotion. Am. J. Heal. Behav. 21 (4), 260–268.

Stryker, S., Burke, P.J., 2000. The past, present, and future of an identity theory. Soc. Psychol. Q. 63 (4), 284–297.

Sweet, C., 2000. Overcoming Addiction: Positive Steps for Breaking Free of Addiction and Building Self-Esteem. Piatkus Books, London, England.
Tauras, J.A., 2006. Smoke-free air laws, cigarette prices, and adult cigarette demand. Econ. Inq. 44 (2), 333–342.
Thomas, G.O., Poortinga, W., Sautkina, E., 2016. The Welsh Single-Use Carrier Bag Charge and behavioural spillover. J. Environ. Psychol. 47, 126–135.
Truelove, H.B., Carricob, A.R., WebercKaitlin, E.U., Raimid, T., Vandenbergh, M.P., 2014. Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. Glob. Environ. Chang. 29, 127–138.
Wasserman, J., Manning, W.G., Newhouse, J.P., Winkler, J.D., 1991. The effects of excise taxes and regulations on cigarette smoking. J. Heal. Econ. 10 (1), 43–64.
Wehby, G.L., Courtemanche, C.J., 2012. The heterogeneity of the cigarette price effect on body mass index. J. Heal. Econ. 31 (5), 719–729.
Wehby, G.L., Murray, J.C., Wilcox, A., Lie, R.T., 2012. Smoking and body weight: Evidence using genetic instruments. Econ. Hum. Biology 10 (2), 113–126.
Wildman, J., Hollingsworth, B., 2012. The impact of the public smoking ban on obesity in Australia. In: Presented at the 9th European Conference on Health Economics. Zürich.
Yörük, B.K., Yörük, C.E., 2011. The impact of minimum legal drinking age laws on alcohol consumption, smoking, and marijuana use: Evidence from a regression discontinuity design using exact date of birth. J. Heal. Econ. 30 (4), 740–752.
Yurekli, A.A., Zhang, P., 2000. The impact of clean indoor-air laws and cigarette smuggling on demand for cigarettes: an empirical model. Heal. Econ. 9 (2), 159–170.