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The Interaction Between Personality and Health Policy: Empirical Evidence from the UK Smoking Bans

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ABSTRACT

The Interaction Between Personality and Health Policy: Empirical Evidence from the UK Smoking Bans*

We investigate whether responses to the UK public places smoking ban depend on personality. Drawing on individual level panel data from the British Household Panel Survey (BHPS) we exploit variation in the timing and location of these bans to establish their overall effect on smoking outcomes, and how this differs by personality. We measure personality using the Big Five personality traits. We are particularly interested in conscientiousness, given the evidence that it is a good proxy for self-control. Overall, we find that a one standard deviation increase in conscientiousness leads to a 1.4 percentage point reduction in the probability of smoking after the ban. Notably, this is the only Big Five personality trait that interacts with the smoking ban. This finding is very robust to different specifications.

JEL Classification: C23, D04, I10, I12, I18, H75

Keywords: smoking ban, personality, Five Factor Model, conscientiousness

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1.1. Introduction

Smoking remains a major global public health concern. In the United Kingdom (UK), approximately 100,000 preventable deaths can be attributed to smoking (Office for National Statistics 2016). Smoking also imposes high costs on publicly funded health systems and may be viewed as exacerbating health inequalities given that smoking is concentrated among those of low socio-economic status (Jones et al. 2011). Several policy interventions have targeted smoking in the past decades in the UK including, a ban on smoking in public places. These bans were implemented primarily to reduce the health damage from second-hand smoke and to increase the opportunity cost of smoking to smokers (Bauld 2011). Notably, increases to opportunity cost serve to directly reduce smokers' utility (Christiansen & Smith 2012). Smoking bans also act as a commitment device for individuals trying to quit smoking but failing due to limited self-control (Bartolome & Irvine 2010).

The effects of public smoking bans on smoking cessation has been well explored in the literature with ambiguous results across countries¹. The major lesson from this literature is that there is a potential for differential responses to public smoking bans depending on individual characteristics (Kuehnle & Wunder 2017). Intuitively this raises the possibility that personality can be important. In this study we explore the extent to which responses to a public smoking ban vary in intensity depending on a smoker's level of conscientiousness. Notably conscientiousness has already been shown to be a proxy for self-control and inversely related to smoking behaviour (Terracciano & Costa 2004; Ameriks et al. 2007).

¹ Evidence from Italy suggests that the public smoking ban reduced smoking prevalence and cigarette consumption (Buonanno & Ranzani 2013). Using a difference-in-differences model Hajdu and Hajdu (2018) find that the smoking ban in Hungary improved health at birth with a larger effect for children of parents with low educational attainment. In a choice experiment, Hammar & Carlsson (2005) find that smokers who intend to give up smoking are particularly likely to quit smoking after a public smoking ban. For both Germany and the UK, evidence suggests that smoking bans affected consumption of different subgroups only: Heavy smokers and younger smokers in the UK and frequent restaurant visitors in Germany (Anger et al. 2011; Jones et al. 2011).

Conscientiousness is one of the Big Five personality traits frequently used in personality psychology (John & Srivastava 1999); the others being extraversion, neuroticism, agreeableness and openness². Our study is complementary to work by (Fletcher et al. 2009) who find that individuals with low levels of conscientiousness are less responsive to tobacco taxes. The authors argue that taxes fail to fully reach individuals who are most likely to be smokers. They highlight that this finding is in line with the cue-triggered model of addiction in which addicted smokers become price insensitive when triggered by cues. It also complements work by Ah et al. (2005) who show that conscientious youths in the US have a lower propensity to start smoking and smoke less on average. Also related is research by Pluess & Bartley (2015) who find that childhood conscientiousness explains approximately 5% of the social gradient in smoking. In addition to smoking behaviour conscientious has been linked positively to the propensity to seek preventative care (Bogg & Roberts 2013), adhere to health guidance (Heckman 2007) and consume alcohol Hagger-Johnson et al. (2012).

Our study contributes uniquely to the health policy literature in the following ways:

1. This is the first study to empirically consider differential responses to a smoking ban by personality, and specifically conscientiousness. Intuitively, an individual's level of conscientiousness can affect the probability of quitting smoking by interacting with newly introduced public smoking bans.

2. Our work provides valuable insights into the effectiveness of anti-smoke regulation and raises the issue of whether this type of regulation needs personalisation.

3. Given that personality, and specifically conscientiousness, is malleable from early ages, our work provides evidence that can inform those thinking about whether downstream policies that promote better soft skills are worthwhile.

4. Building on Terracciano & Costa (2004) who argue that conscientiousness only became an important determinant of smoking initiation over time, we explore whether there is an interaction between conscientiousness and cohort effects. Intuitively, older

² Elsewhere, The Big Five have been shown to predict important life outcomes, such as mortality (Pluess & Bartley 2015), labour market outcomes including wages and unemployment spells (Heineck & Anger 2010; Derya & Pohlmeier 2011), income deprivation (Cuesta and Budría 2015) and education (Almlund et al. 2011).

generations became addicted to smoking before the adverse health impacts became common knowledge and before the implementation of major anti-smoke interventions (see Appendix A Table A.1). It follows, that conscientiousness matters much less for smoking initiation in older generations than for young generations because they underestimated the health costs of smoking initially. In comparison, younger generations have full information of adverse health impacts of smoking when weighing current benefits against future costs of smoking and they are less likely to initiate smoking in the first place (Di Novi and Marenzi 2019). The generational differences then may have implications for the effect of a ban. Conscientious individuals from the older generations may reassess their decision to smoke and quit after the ban. Notably, individuals who are not conscientious can make the same decision but are less likely to follow it through (Ameriks et al. 2007), hence contributing to the interaction between conscientiousness levels and smoking responses to public smoking bans.

Our empirical analysis draws on the British Household Panel Survey (BHPS), a UK individual-level panel data set from 1991 to 2008 in which households were followed yearly for 18 waves between 1991 and 2009. The BHPS has previously been used to study effects of the UK public smoking ban on smoking cessation, self-assessed health, and well-being (Jones et al. 2011; Wildman & Hollingsworth 2013; Leicester & Levell 2016).

Using a fixed effects regression model this study empirically tests the impact of the UK public smoking ban on smoking cessation for smokers with different levels of conscientiousness. It addresses the question of whether the public smoking ban served as a commitment device for individuals with low levels of conscientiousness. It finds that a one standard deviation increase in conscientiousness leads to a 1.4 percentage point reduction in the probability of smoking after the ban. This conclusion is very robust to different specifications. We also demonstrate that the biggest effects of the ban were experienced by smokers on the lower end of the conscientiousness distribution, with those at the very bottom not being reached.

This study also finds that for conscientious individuals of cohorts that were born before the dissemination of information on adverse health impacts of smoking, a one standard deviation increase in conscientiousness reduces the probability of smoking after the ban by 2.6 percentage points. This finding supports the hypothesis that the interaction

between smoking and public smoking bans matters more for the smoking behaviour of conscientious persons who initiated their habit before the health effects were well known.

1.2. Data:

1.2.1. BHPS

We use all 18 waves of the original sample of the British Household Panel Survey (BHPS), a longitudinal study of around 5,500 households and over 10,000 individuals in England, Wales and Scotland that began in 1991. This main sample was supplemented in later years with a Welsh extension from 1999 (about 1500 households), a Scottish extension from 1999 and a Northern Ireland extension from 2001 (about 1900 households). Our analysis relies on two samples of this data. First, we utilise the entire sample when modelling the decision to smoke. Second, we restrict the sample to those who smoked at one point in time when considering the decision to quit. This reduced sample of “ever smokers” contains 62,430 observations. The BHPS has previously been used to study effects of the UK public smoking ban on smoking cessation, self-assessed health, and well-being (Jones et al. 2011; Wildman & Hollingsworth 2013; Leicester & Levell 2016)³.

The main outcome variable used in this study is based on the respondents self-reported smoking status, and the reported number of cigarettes smoked daily. The Big Five personality taxonomy is a concept in personality psychology encompassing conscientiousness, neuroticism, openness, agreeableness and extroversion (Costa & McCrae 1992)⁴. It was recorded in wave 15 of the BHPS and 5,100 individuals responded. The Big Five questionnaire in the BHPS has been reduced to 15 questions, three per character trait.⁵ This short version of the five-factor model has been shown to be closely related to a more extensive version (Tavares 2010). Specifically, individuals were asked three questions for each characteristic with answers ranging from “does not

³ The panel data set is unbalanced due to attrition. Attrition was, however, low with yearly attrition of 5 per cent (Donnellan & Lucas 2008). Individuals for whom the year of interview was missing were dropped.

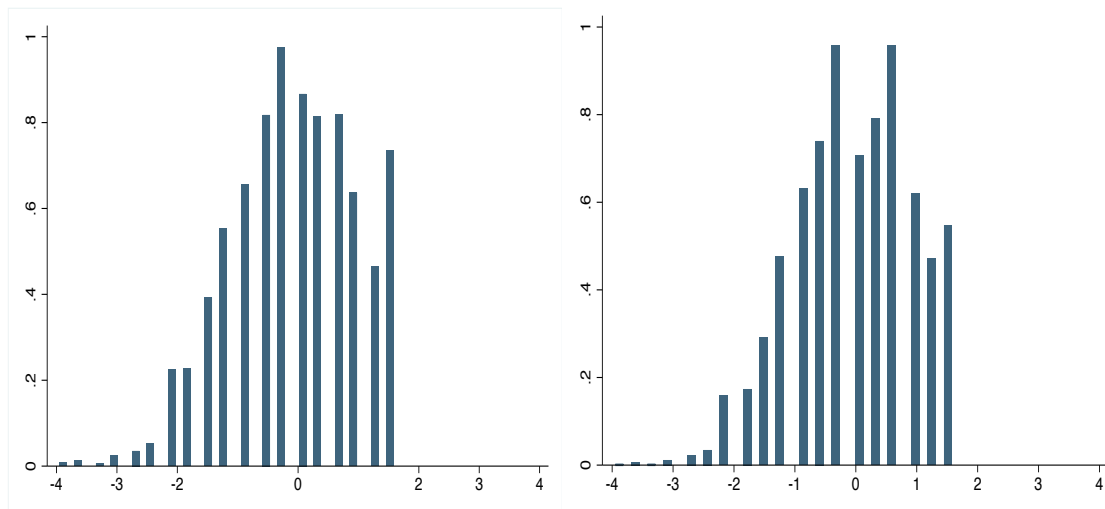
⁴ Elsewhere, The Big Five have been shown to predict important life outcomes, such as mortality (Pluess & Bartley 2015), labour market outcomes including wages and unemployment spells (Heineck & Anger 2010; Derya & Pohlmeier 2011) and education (Almlund et al. 2011).

⁵ See Appendix A Table A.4 for the list of questions asked in the BHPS to define each personality trait.

apply” to “applies perfectly” on a seven-point scale. Each personality variable was generated by adding the respective answers for all three questions such that the highest possible variable level is 21 and the lowest value is 3⁶. We standardise each trait to have a mean of zero and a standard deviation of one, to ease interpretation of the regression results. We assume that personality is fixed in adulthood, which has been shown in the literature to be a reasonable assumption (Cobb-Clark and Schurer, 2012; Tavares, 2010, Terracciano and McCrae, 2006 and Roberts & DelVecchio 2000). Notably, personality types were recorded in 2005, which is shortly before the UK ban in 2006/2007, making the assumption of stability of personality more plausible. As a robustness check we later restrict the study period to 2005 to 2008. Over this narrow window it is highly unlikely that personality will change significantly for the average individual,

The main dependent variable *smoker* is a dummy that equals one if a respondent is a smoker and zero if not. *Number of daily cigarettes* is also considered as a dependent variable. Both variables were recorded in each wave. Figures 1.1 and 1.2 below illustrate the distribution of the conscientiousness variable by smoking status.

Figures 1.1 and 1.2: Distribution of conscientiousness by smoker and non-smoker status respectively



Notes: The figure shows the distribution of the Big Five personality variable conscientiousness for smokers on the left versus non-smokers on the right side.

⁶ Reversely asked variables were back coded.

When considering the effects of the ban for different cohorts we utilise the following definitions:

1. A cut-off birth year for the ‘Hooked Generation’ of 1949. This threshold is chosen as the first major policy intervention prohibiting TV advertising of cigarettes was implemented in 1965 when this generation was 16 (See Appendix A Table A.1). 16 is the average age of smoking initiation in the BHPS. Generations born before 1949 hence likely made the smoking decision under limited information.
2. The ‘Middle Generation’ are those born between 1950 and 1971. This cohort was increasingly exposed to major interventions such as health warnings published in 1986.
3. The ‘Informed Generation’ is the generation born between 1971 and 1990. Most health information became available in the 1990s (IfG 2007).

[Table 1](#) below documents the descriptive statistics for the key variables utilised in this study, for the full sample and separately by smoking status. Notably, the descriptive statistics highlight an inverse relationship between conscientiousness and the probability of smoking. Specifically, individuals with higher levels of conscientiousness are less likely to be smokers and also consume slightly fewer cigarettes.⁷

⁷ Table A.2 in appendix A provides a more detailed list of summary statistics. Table A.3 in appendix A also shows personality traits and smoking statistics for each of the three generations. We note in Table A.3 the proportion of the ‘hooked’ generation is the lowest at 0.2. This is likely owed to selection effects mechanically being larger for the ‘hooked’ generation as smokers are more likely to die younger (see: <https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-smoking/statistics-on-smoking-england-2018/part-3-smoking-patterns-in-adults>)

Table 1: Descriptive statistics

	(1)		(2)		(3)	
	Full Sample		Smokers		Non-Smokers	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Smoking Status						
Smoker	0.258	0.438	1	0	0	0
Number of Cigarettes	15.285	8.409	15.285	8.409	.	.
Big Five Personality Traits						
Conscientiousness	0	1	0	1	0	1
Neuroticism	0	1	0	1	0	1
Extraversion	0	1	0	1	0	1
Agreeableness	0	1	0	1	0	1
Openness	0	1	0	1	0	1
<i>N</i>	172.546		43.586		125.368	

Notes: Mean values and standard deviations are reported for key descriptive statistics and control variables used in the later regression analysis. Smoker is a dummy indicating whether an individual smokes.

1.3. Methodology

The primary aim of this study is to evaluate the effect of the UK public smoking ban depending on a smokers' level of conscientiousness and to consider whether there are differential effects across smoking cohorts. We begin by determining whether conscientiousness predicts a lower likelihood of smoking and cigarette consumption, with an eye to exploring whether this tendency varies across the three generations. To achieve this, we estimate the following specification:

$$y_{irt} = \alpha + \delta' * C_{irt} + \beta' * X_{irt} + \mu_t + \vartheta_r + \varepsilon_{irt} \quad (1)$$

In equation 1 i denotes the individual, t denotes time (month/year of interview) and r denotes region (Scotland, England, Wales, Northern Ireland). y is either a dummy variable indicating that a person is a smoker, or a count of the number of cigarettes consumed weekly. C is then the standardised level of an individual's conscientiousness. μ_t and ϑ_r are fixed effects for month/year and region respectively. Including time fixed

effects allows for time-varying effects that are the constant across individuals, such as cigarette tax increases, seasonality in smoking and dissemination of information about smoking health impacts. Time fixed effects also pick up the general downward trend in smoking prevalence that occurred all over the UK (Bruederl & Ludwig 2011). Region fixed effects allow for constant differences across regions, such as cultural attitudes towards smoking. X is then a vector of control variables containing the other four standardised personality traits. In addition, X contains age, age squared, gender, a dummy denoting if a person has a degree, employment status⁸, the number of children in the household, equivalised household income, marital status⁹ and a dummy that is equal to one if a person is an immigrant and zero otherwise. A negative and significant δ' is evidence that conscientious people are less likely to smoke and/or consume fewer cigarettes. We run regressions for the full BHPS sample, and also separately for the hooked, middle and informed generations. Standard errors are clustered at the individual level.

To consider how the smoking ban affected individuals with varying levels of conscientiousness differently we rely on the following model:

$$y_{irt} = \alpha + \gamma' Ban_{rt} * C_{irt} + \beta' * X_{irt} + \mu_t + \vartheta_r + \delta_i + \varepsilon_{irt} \quad (2)$$

All definitions in equation (2) are consistent to equation (1) with a few additions. First, we only consider those that have smoked at least once in the panel as we care most about the effect of the ban on smokers (and do not observe initial decisions to smoke). Specifically, in equation (2) Ban is a dummy variable that is equal to 1 if an individual was affected by the ban and zero otherwise. The ban on smoking in enclosed public places, including workplaces, pubs and restaurants was implemented in the UK in 2006/2007 as part of the country's smoke-free regulation (IfG 2007). The public smoking ban was implemented on 26 March 2006 in Scotland, on 1 July 2007 in England , on 2

⁸ A dummy indicating whether a person is employed and zero otherwise

⁹ Categories are married, never married and Divorced/Separated/Widowed

April 2007 in Wales and on 30 April 2007 in Northern Ireland. (Jones et al. 2011). Given the ban was implemented at different times in different regions across the UK, it equals one if an individual was interviewed in a month after the introduction of the ban in her respective region of residence (April/2006 Scotland, April/2007 Wales, May/2007 Northern Ireland, July/2007 England) and is zero otherwise. The variation in timing of the ban across UK regions provides a quasi-natural experiment assuming that any differences in attitudes towards smoking remain fixed over the sample period they are captured by the region fixed effects. We view this as a most reasonable assumption, particularly when the analysis is restricted to a very short time period (but do consider additional robustness checks, see below).

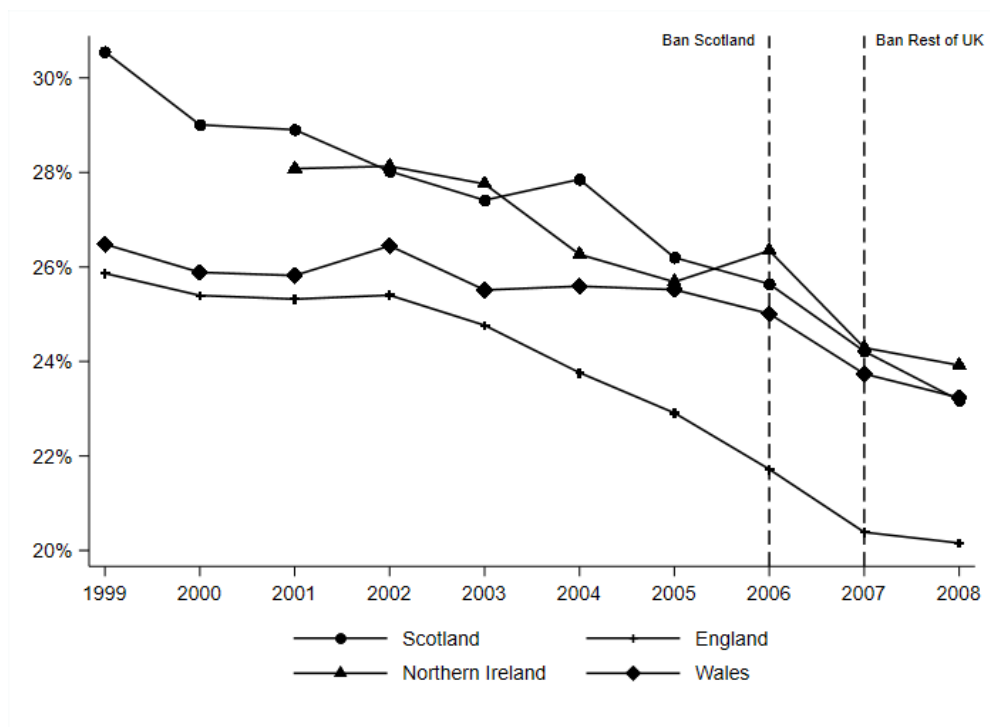
$Ban_{rt} * C_{irt}$ is the interaction between the ban dummy variable and an individual's standardised measure of conscientiousness. We add to vector X interactions with the ban variable and the other four standardised personality traits. Otherwise, X has identical variables as per equation (1). δ_i is a set of individual fixed effects. Because δ_i is included in equation 2, C_i and the four other personality traits drop out of the equation as they are time invariant. Thus, if we take the smoking ban as a shock we can interpret ω' as the causal impact of the ban on the propensity to smoke. γ' then highlights how this differs by levels of conscientiousness. In other words. γ' captures any heterogeneous responses to the smoking ban by a smokers' level of conscientiousness. Standard errors are clustered at the individual level and for unknown heterogeneity.

We do note that estimating the true causal impact of the smoking ban is difficult given that there might still be omitted variables that differ across individuals, regions and/or time, which are correlated with both the ban and smoking. For example, anti-smoking sentiments potentially differ within UK regions and disentangling those from the purely mechanical effect of the ban is difficult. Given that smoking prevalence and other characteristics also differ substantially across geographic areas in the UK, there might be other confounding factors that lead to heterogeneous responses to the ban. To abate these concerns, in later specifications, the observation period is reduced to years closer to the ban to ensure that the coefficient is not picking up other smoking policies or varying attitudes. Close to the ban, there was no other major policy that was implemented (See

Table A.1 in appendix A) except steady price increases. These are controlled for by month crossed by year fixed effects.

We note that the smoking ban was supposed to be implemented in England in the same year as in Scotland but the policy was delayed at Cabinet level. The smoking ban was already discussed in all UK regions in 2002 (ASH 2017). This indicates that sentiments towards smoking in Scotland and the rest of the UK population were probably already similar in 2006 and the exact timing of the bans, the treatment assignment, is likely to be exogenous i.e. the exact timing of the initiation of the ban was not owed to variation in sentiment across population. A further robustness therefore reduces the sample to England and Scotland only given that pre-treatment trends in smoking prevalence are the most similar for those two regions as can be seen in Figure 1 below.

Figure 1: Smoking Prevalence by Country and Year



Notes: The figure shows smoking prevalence in percent by year for Scotland, England, Northern Ireland and Wales. The ban was implemented in Scotland in 2006 and in England in 2007.

1.4. Results

[Table 2](#) documents the results from estimating equation 1. From column (1), a one standard deviation increase in conscientiousness is associated with a one percentage point reduction in the probability of being a smoker. Notably, conscientiousness does not significantly predict the probability of smoking for the hooked generation, consistent with the idea that conscientiousness does not matter for this group given that the negative effects of smoking were not known to this group when making the initial decision to smoke. However, conscientiousness does matter for both the middle and informed generation. As expected, the coefficient for conscientiousness is most substantive for the informed generation. From column (4), a one standard deviation increase in conscientiousness is associated with a 2.8 percentage point reduction in the probability of being a smoker.

The remaining four personality traits also predict the propensity to smoke. In general individuals who are extravert and neurotic are more likely to smoke, and those that are open and agreeable are less likely to smoke.

Conscientiousness also decreases the number of cigarettes smoked significantly for smokers, albeit the implied size of the effect is modest. A one standard deviation increase in conscientiousness implies 0.136 less cigarettes smoked per day. We note that this effect is again driven solely and only significant for the hooked generation, consistent with our hypothesis. Notably, neuroticism also significantly predicts the number of cigarettes that an individual smokes but the size is modest. Interestingly the signs on these effects differ from hooked (negative) as compared to the middle and informed generations, echoing the sentiment that hooked smokers are a different type to the middle and informed generation.

Table 2: Effect of Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Smoker				No. of Cigarettes			
	Full Sample	Hooked Generation	Middle Generation	Informed Generation	Full Sample	Hooked Generation	Middle Generation	Informed Generation
Big Five								
Conscientiousness	-0.01 (0.004)	0.001 (0.006)	-0.016 (0.007)	-0.028 (0.008)	-0.136 (0.047)	-0.576 (0.299)	0.0353 (0.225)	0.101 (0.185)
Neuroticism	0.012 (0.004)	0.003 (0.006)	0.011 (0.006)	0.027 (0.007)	0.231 (0.045)	-0.0442 (0.0825)	0.314 (0.0709)	0.35 (0.0735)
Agreeableness	-0.008 (0.004)	-0.001 (0.006)	-0.007 (0.007)	-0.022 (0.007)	-0.175 (0.046)	-0.124 (0.0851)	-0.157 (0.0735)	-0.27 (0.0742)
Openness	-0.013 (0.004)	-0.02 (0.006)	-0.006 (0.006)	-0.012 (0.008)	-0.363 (0.047)	0.0347 (0.0814)	-0.736 (0.0759)	-0.357 (0.0855)
Extraversion	0.028 (0.004)	0.017 (0.005)	0.006 (0.002)	0.039 (0.008)	0.2 (0.049)	0.404 (0.0888)	0.158 (0.0765)	0.0354 (0.0837)
Observations	154,142	57,285	64,029	32,828	38,739	10,960	17,582	10,197
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: Pooled OLS coefficient estimates are reported, with robust standard errors in parentheses. The full BHPS data set from 1991 to 2008 is used. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971

Turning to [Table 3](#), we note the coefficient on the ban is never significant and is centered around zero. This implies that the main effect of the ban was zero (we note this conclusion is robust to the exclusion of the personality traits interactions and all controls, and these results are documented in Appendix B, Table B.2 and B.3 respectively¹⁰. It is also the case when regressions are run that omit personality variables all together see Appendix B, Table B.1). However, its interaction with conscientiousness is significant in column (1). Specifically, the estimates in Table 3 imply that smokers who have a level of conscientiousness that is one standard deviation above the mean has a 1.4 percentage point reduction in the propensity to smoke after the smoking ban. For those that are two standard deviations above the mean the implied effect is then a 2.8 percentage point reduction. In other words, overall conscientious persons quit more often after the ban. However, the estimates also imply that those of lower levels of conscientiousness are less likely to quit smoking after the ban, for example, those with a level of conscientiousness that is one standard deviation below the mean, the implied effect is a 1.4 percentage point increase in the propensity to smoke. This bellies the importance of investigating non-linearities which we do subsequently.

From Table 3, columns (1) to (4) document the average effect results, and also these separately for the three generations from regressions that model a smokers propensity to continue smoking after the ban. The estimates illustrate clearly that conscientiousness interacts with the ban only for the hooked generation in terms of propensity to smoke. In other words, it is the hooked generation that is driving the significant effect depicted in column (1). For this group of smokers an increases of one standard deviation in conscientiousness implies a 2.6 percentage point reduction in the likelihood of smoking after the ban. Overall, the estimates suggest that the ban causes older conscientiousness smokers to quit more often than other smokers. In contrast the coefficients for the middle

¹⁰ Further we note additional robustness in appendix B. First, in Table B.4 we restrict the sample to the working age population as personality types have been shown to be most stable at that age (Cobb-Clark and Schurer, 2012). We note that the main effect becomes not significant, which is not surprising, given that Table 3 already highlighted that the main effects of the conscientiousness*ban variable was through the Hooked Generation, with Table 2 indicating that those who are conscientious in younger cohorts are less likely to smoke in the first place. In Table B.5 we follow Brown and Taylor (2014) and regress each personality trait on a polynomial of age and use the standardised residual for the further analysis to account for the potential influence of personality at the time it was recorded. Our overall conclusions from Table 3 are very robust to this additional analysis.

Table 3: Fixed Effects: Effect of the ban on smoking for different personalities

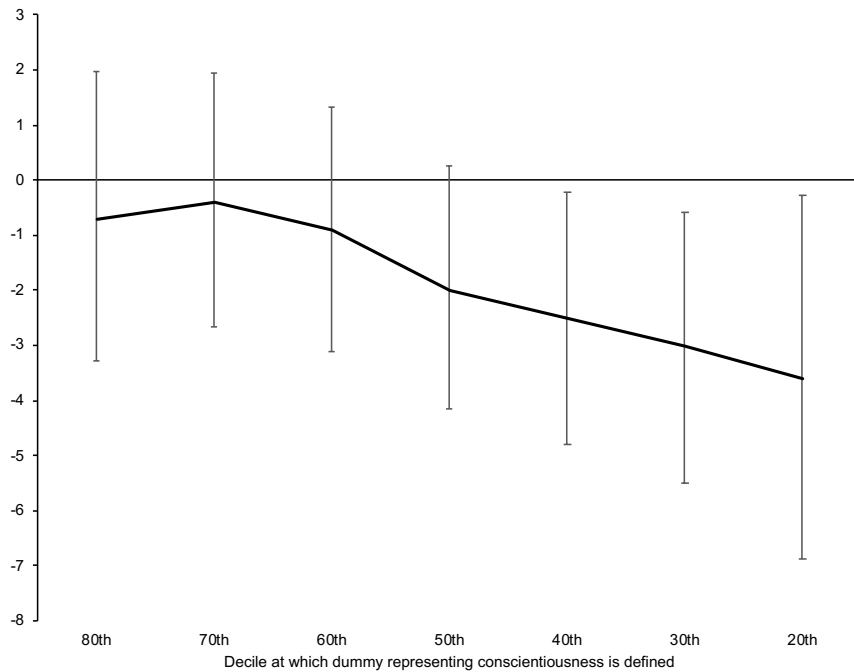
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Smoker				No. of Cigarettes			
	Full Sample	Hooked Generation	Middle Generation	Informed Generation	Full Sample	Hooked Generation	Middle Generation	Informed Generation
Ban	0.015 (0.012)	0.025 (0.022)	0.011 (0.017)	0.026 (0.029)	-0.341 (0.236)	-0.599 (0.463)	-0.107 (0.348)	-0.399 (0.440)
Ban*Conscientiousness	-0.014 (0.006)	-0.026 (0.011)	0.009 (0.009)	-0.007 (0.011)	-0.123 (0.104)	0.0257 (0.197)	-0.0643 (0.178)	-0.264 (0.165)
Ban*Neuroticism	0.001 (0.005)	0.003 (0.01)	-0.001 (0.008)	0.005 (0.011)	-0.211 (0.101)	-0.187 (0.2)	-0.126 (0.159)	-0.396 (0.17)
Ban*Extraversion	-0.003 (0.006)	0.01 (0.011)	-0.02 (0.009)	0.007 (0.013)	-0.152 (0.11)	-0.137 (0.232)	-0.116 (0.169)	-0.339 (0.181)
Ban*Agreeableness	0.008 (0.006)	0.017 (0.011)	0.002 (0.008)	0.006 (0.011)	0.208 (0.103)	0.159 (0.224)	0.145 (0.155)	0.357 (0.172)
Ban*Open	0.000 (0.006)	-0.001 (0.01)	0.009 (0.009)	-0.006 (0.013)	0.027 (0.107)	0.155 (0.188)	0.0502 (0.18)	-0.183 (0.188)
Observations	56,002	16,126	25,150	14,726	38,095	10,888	17,450	9,757
Number of Individuals	4,930	1,201	2,011	1,720	4,761	1,161	1,959	1,643
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*(Conscientiousness/Neuroticism/Extraversion/Agreeableness/Open) is an interaction of a dummy variable ban and the respective standardised Big Five personality variable. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

and informed generations are centered around zero and not significant. With few exceptions, the coefficients on the other four personality traits are also centered around zero and not significant. This tells us that conscientiousness is the only Big Five personality trait that matters with respect to interacting with the smoking ban for a smoker's propensity to smoke. Table 3, columns (5) to (8) document the results from regressions that model the number of cigarettes smoked by smokers. These estimates are noisier and always not significant.

Our measure of conscientiousness in Table 4 is a continuous measure with 0 mean and a standard deviation of 1. It is interesting to consider what part of the distribution drives the significant effect observed for the propensity to smoke in Table 4. To tease this out we replace our measure of conscientiousness with a binary variable that is assigned equal to 1 if a person is conscientious, and zero otherwise. We run this model for multiple definitions of conscientiousness. Specifically, we define these set of variables to be equal to 1 if an individual is at the 80th, 70th, 60th, 50th, 40th, 30th, or 20th decile in the distribution of conscientiousness and 0 otherwise. For regressions, where the dummy is equal to 1 for individuals who are in the 80th decile of conscientiousness or above, the reference group is then everyone below this decile. Estimates of these regressions are illustrated in Figure 2, and we document full estimates in Appendix C Table C.1 to C.6. These estimates demonstrate that support for the effects documented in Table 4 comes from the bottom half of the conscientiousness distribution. For example, the biggest effects are evident when conscientiousness is defined as everyone in the 20th decile of conscientiousness or above. Notably all other effects are negative, but get smaller as we restrict the definition of conscientiousness to higher levels of conscientiousness, implying that those at the very end of the conscientiousness distribution were the least affected.

Figure 2: Smoker regression estimated separately by conscientiousness decile



Notes: The figure shows the estimation coefficients of the smoker regression with varying conscientiousness decile variables where the conscientiousness variable is defined to be equal to 1 if an individual is at the 80th, 70th, 60th, 50th, 40th, 30th, or 20th decile in the distribution of conscientiousness respectively and 0 otherwise.

[Table 4](#) presents additional robustness analyses. We begin with restricting the analysis to a time to the following time period: 2005 to 2008. Given that no other policies were implemented in this window this allows for more confidence that the estimates are not driven by other anti-smoke interventions. It is also more reasonable to assume that regional differences in attitudes towards smoking remain fixed over the sample period. Using 2005 as a start date for the analysis also relaxes the assumption that personality is fixed over a long period. Given that personality traits were recorded in 2005, it is reasonable to assume for the average person that they are fixed over a three-year period. Notably, specification (1) in [Table 4](#) confirms that the coefficient remains stable when this change is considered.

Table 4: Robustness Checks: Fixed Effects: Effect of the ban for different subsamples

	(1)	(2)	(3)
	Restricted time		Restricted regions
	2005-2008	1991-2008	2003-2008
Sample Restrictions	UK	Scotland & England	England
Dependent Variable	Smoker	Smoker	Smoker
Ban	0.009 (0.011)	0.022 (0.013)	-0.466 (0.224)
Ban*Conscientiousness	-0.011 (0.005)	-0.019 (0.007)	-0.011 (0.009)
Observations	17,475	43,262	34,562
Number of individuals	4,887	3,398	2,557
Controls	YES	YES	YES
Region FE	YES	YES	YES
Time FE	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Conscientiousness is an interaction of a dummy variable ban and a standardised conscientiousness variable. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The regression further controls for the remaining Big Five personality variables interacted with the ban dummy.

Second, we restrict the sample to England and Scotland in column (2) [Table 4](#). As discussed, these countries are arguably better comparators given they have similar trends (see Figure 1). When restricting the sample to England and Scotland, the coefficient increases to 1.9 percentage point.

Finally, we consider a model for England only with a short time window (2003-2008). This is essentially a before and after analysis. The estimates are documented in

[Table 4](#) column (3). The estimated coefficients are stable, albeit the standard errors are less precise.

1.5. Conclusion

Our work explores whether personality interacted with the UK smoking ban in terms of how responsive an individual was to quitting smoking. We exploit panel data and employ numerous robustness analyses to highlight that in this regard conscientiousness is the most important of the Big Five personality traits, at least when it comes to the smoking bans initiated in the UK. Notably, conscientiousness matters for the ‘Hooked Generation’ i.e. the smokers who began smoking prior to the health effects becoming known.

Overall, we view our work as raising the question as to whether personalisation of health policy is an avenue worth exploring further in health policy. This work shows that the effectiveness of public smoking bans hinges on individual characteristics and that the public smoking ban potentially failed to reach individuals who are most likely to be smokers in the first place; individuals with low levels of conscientiousness. This conclusion is echoed by the estimates illustrated in Figure 2 above which clearly demonstrate that the biggest effects of the ban were experienced by those on the lower end of the conscientiousness distribution, however those at the very bottom were not reached. This finding has important policy implications: First, tailoring smoking interventions to individuals with low levels of self-control by, for example, providing stricter commitment devices may be promising to reduce overall smoking prevalence. Second, addressing conscientiousness during childhood could prevent smoking initiation and potentially also has spill-over effects for other life outcomes, including health. This is in line with the ‘Healthy Minds’ study by Lordan and McGuire (2019), which implemented a curriculum fostering personal, social, health and economic education in UK high schools in a randomised trial. They found a positive and significant impact of this extended curriculum on general health, life satisfaction, physical health and behaviour; a finding that highlights that childhood soft skills interventions have the potential to improve long-term life outcomes.

Our work also emphasises the importance of exploring heterogenous responses to smoking policies, rather than focusing on average treatment effects. It shows that

providing information on adverse health effects of smoking through the means of a public ban had an effect on individuals with higher levels of conscientiousness only. This finding is, for example, potentially relevant in the context of the current debate around adverse health effects from smoking electronic cigarettes ('vaping'). Given our evidence, interventions aimed at reducing vaping and at distributing information on health costs of vaping may only reach conscientious individuals.

1.6. References

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Appendix A: Study and Data Context

Table A. 1: Timeline of smoking policies and information dissemination

Year	Intervention
1950	First established link between smoking & lung cancer (Doll & Hill, 1950)
1965	Ban on cigarette advertising in UK
1971	First health warnings on cigarette packages as part of an agreement between the tobacco industry and the UK Government
1976	Links between smoking & mortality in a 20-year study by Prof. Doll and Richard Doll
1984	Smoking ban on London Underground
1986	Ban on advertising in cinemas & Health Warnings
1988	Link between second-hand smoke & lung cancer: 10%-30% Higher risk of lung cancer when being exposed to second-hand smoke
1993	Researcher find that smokers are three times more likely to die in middle-age than non-smoker
1998	Government disclaims second-hand smoke to be cause of lung cancer and heart diseases
2000	Court case against Philip Morris and RJ Reynolds even though smoker had started smoking after appearance of health warnings on cigarette packs
2001	EU Directive for more warnings on tobacco packs
2002	First call for ban in public places by British Medical Association
2005	Increased information about adverse health impacts of second-hand smoking
2005	Northern Ireland agrees to implement a ban in 2007 whilst a ban in England is delayed at Cabinet level
2006	Ban on smoking in public places in Scotland
2007	Ban on smoking in public places in England, Wales and Northern Ireland
2008	Pictorial Health warnings required on tobacco packages
2011	Tobacco product display ban all over UK
2011	Ban on sales from vending machines all over UK
2016	Introduction of Plain Packaging in UK

Notes: The source for this table stems from Action on Smoking and Health (2017): "Key dates in the History of Anti-Tobacco Campaigning".

Table A.2 Descriptive Statistics for all variables used in the study

	(1)		(2)		(3)	
	Full Sample		Smoker		Non-Smoker	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Smoker	0.258	0.438	1	0	0	0
Number of Cigarettes	15.285	8.409	15.285	8.409	.	.
Regular Smoker (a)	0.803	0.398	0.803	0.398	.	.
Conscientiousness	0	1	0	1	0	1
Neuroticism	0	1	0	1	0	1
Extraversion	0	1	0	1	0	1
Agreeableness	0	1	0	1	0	1
Openness	0	1	0	1	0	1
Age	45.335	17.588	41.094	15.585	46.871	18.007
Sex (b)						
Female	0.553	0.497	0.550	0.497	0.552	0.497
Marital Status						
Never Married	0.261	0.439	0.341	0.474	0.234	0.423
Divorced, Separated or Widowed	0.167	0.373	0.203	0.402	0.156	0.363
Married	0.571	0.495	0.457	0.498	0.610	0.488
Educational Qualification (c)	0.785	0.411	0.735	0.441	0.802	0.399
Household Income	2577	2006	2278	1726	2684	2085
Number of Children in Household	0.549	0.948	0.629	1.006	0.520	0.925
Immigrant (d)	0.198	0.399	0.206	0.405	0.201	0.401
Employment (e)						
Unemployed	0.033	0.178	0.065	0.246	0.022	0.146
Employed	0.596	0.491	0.605	0.489	0.592	0.491
Health Status (f)	3.847	0.920	3.668	0.971	3.908	0.894
<i>N</i>	172546		43586		125368	

Notes: Regular smoker is defined as smoking more than 10 cigarettes daily. The omitted sex is male. Educational Qualification is a dummy that equals 1 if the individual has a degree and zero otherwise. Immigrant is a dummy. The omitted category for employment is “out of the labour force” Self-reported health is categorised as: 1=Very Poor, 2=Poor, 3=Fair, 4=Good, 5= Excellent.

Table A.3: Descriptive Statistics of Key Variables by Generation

	(1)		(2)		(3)	
	Hooked Generation		Middle Generation		Informed Generation	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Smoker	0.195	0.396	0.285	0.451	0.322	0.467
Number of Cigarettes	15.828	8.677	16.500	8.654	12.551	6.918
Conscientiousness	15.661	3.555	16.287	3.037	15.374	3.014
Neuroticism	10.466	4.082	11.127	3.806	11.379	3.811
Extraversion	12.757	3.679	13.494	3.477	14.239	3.205
Agreeableness	16.423	3.192	16.371	2.883	16.076	2.897
Openness	12.521	4.008	13.565	3.393	14.042	3.249
<i>N</i>	66121		70319		35841	

Notes: The Hooked Generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table A.4 Big Five Personality Questions in the BHPS

Personality Questions BHPS	
	Respondent ...
Conscientiousness	Does a thorough job Does things efficiently Tends to be lazy*
Extraversion	Is talkative Is reserved* Is outgoing, sociable
Agreeableness	Is sometimes rude to others* Has a forgiving nature Considerate and kind
Neuroticism	Worries a lot Gets nervous easily Is relaxed and handles stress well*
Openness	Is original, comes up with ideas Values artistic, aesthetic experience Has an active imagination

Notes: All questions were answered on a scale from 1=Strongly disagree to 7=Strongly agree. * indicates that the answer was reversely coded.

Appendix B: Robustness Test:

Table B.1: Fixed effect: Effect of the ban on smoking with no personality variables

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes	Smoker		
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.016 (0.012)	-0.342 (0.229)	0.019 (0.021)	0.011 (0.017)	0.030 (0.027)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table B.2: Fixed Effects: Effect of the ban on smoking for conscientious personalities only (other four personality traits removed as controls)

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes		Smoker	
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.013 (0.012)	-0.364 (0.234)	0.019 (0.022)	0.008 (0.017)	0.028 (0.028)
Ban*Conscientiousness	-0.01 (0.005)	-0.034 (0.096)	-0.015 (0.001)	0.008 (0.008)	-0.005 (0.010)
Observations	56,910	38,768	16,560	25,467	14,883
Number of Individuals	5,007	4,837	1,236	2,035	1,738
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . The conscientiousness variable is standardized with a mean of 0 and a standard deviation of 1. Ban*Conscientiousness is an interaction of a dummy variable ban the standardised conscientiousness variable. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table B.3: Fixed Effects: Effect of the ban on smoking for conscientious personalities (all control variables removed)

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	Smoker	No. of Cigarettes	Smoker		
	By Generation				
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.016 (0.012)	-0.334 (0.234)	0.025 (0.022)	0.009 (0.017)	0.03 (0.028)
Ban*Conscientiousness	-0.014 (0.006)	-0.130 (0.102)	-0.024 (0.011)	0.009 (0.009)	-0.007 (0.011)
Ban*Neuroticism	0.001 (0.006)	-0.173 (0.1)	0.002 (0.010)	-0.003 (0.008)	0.007 (0.011)
Ban*Extraversion	-0.005 (0.007)	-0.148 (0.110)	0.008 (0.011)	-0.021 (0.009)	0.002 (0.013)
Ban*Agreeableness	0.008 (0.006)	0.183 (0.102)	0.016 (0.011)	0.002 (0.008)	0.008 (0.011)
Ban*Open	0.001 (0.006)	0.026 (0.107)	-0.001 (0.01)	0.008 (0.009)	-0.004 (0.013)
Observations	56,909	38,739	16,245	25,329	15,335
Number of Individuals	5,020	4,865	1,215	2,029	1,778
Controls	NO	NO	NO	NO	NO
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and the respective standardised Big Five personality variable. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables are excluded. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table B.4 Fixed Effects: Effect of the ban on smoking for conscientious personalities, ages 25-59 only.

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	Smoker	No. of Cigarettes	Smoker		
	By Generation				
			Hooked Generation (Younger than 59)	Middle Generation	Informed Generation (Older than 25)
Ban	0.017 (0.016)	-0.264 (0.302)	0.074 (0.063)	0.011 (0.017)	0.025 (0.040)
Ban*Conscientiousness	0.007 (0.008)	-0.086 (0.142)	-0.044 (0.028)	0.009 (0.009)	0.007 (0.015)
Ban*Neuroticism	0.0023 (0.007)	-0.224 (0.130)	0.034 (0.033)	-0.001 (0.008)	0.007 (0.014)
Ban*Extraversion	-0.014 (0.008)	-0.225 (0.140)	0.003 (0.035)	-0.020 (0.01)	0.006 (0.017)
Ban*Agreeableness	0.004 (0.007)	0.216 (0.131)	0.037 (0.040)	0.002 (0.008)	0.001 (0.015)
Ban*Open	-0.001 (0.008)	-0.033 (0.148)	0.02 (0.029)	0.009 (0.009)	-0.025 (0.018)
Observations	36,376	24,873	1,856	25,150	9,370
Number of Individuals	3,020	2,933	144	2,011	867
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and the respective standardised Big Five personality variable. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table B.5 Fixed Effects: Effect of the ban on smoking for conscientious personalities, using standardised personality measures following Brown and Taylor 2014

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes		Smoker	
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.015 (0.012)	-0.363 (0.235)	0.025 (0.022)	0.008 (0.02)	0.027 (0.028)
Ban* Age-effect-free Conscientiousness	-0.014 (0.006)	-0.123 (0.106)	-0.026 (0.011)	0.009 (0.009)	-0.007 (0.011)
Ban* Age-effect-free Neuroticism	0.003 (0.006)	-0.210 (0.102)	0.004 (0.010)	0.0002 (0.008)	0.005 (0.011)
Ban* Age-effect-free Extraversion	-0.001 (0.006)	-0.145 (0.107)	0.011 (0.011)	-0.019 (0.01)	0.007 (0.012)
Ban* Age-effect-free Agreeableness	0.006 (0.006)	0.210 (0.105)	0.016 (0.011)	0.001 (0.008)	0.006 (0.011)
Ban* Age-effect-free Open	0.004 (0.006)	0.03 (0.108)	0.001 (0.01)	0.01 (0.009)	-0.006 (0.013)
Observations	56,002	38,095	16,126	25,150	14,726
Number of Individuals	4,930	4,761	1,201	2,011	1,720
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . All Big Five personality variables were regressed on age-squared and the residual of this regression was then standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality Age-effect-free is an interaction of a dummy variable ban and the respective standardised Big Five personality residual variable. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Appendix C: Tracing out the Effects

Table C.1 Effect of being in the top 20% (i.e. 80th decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes	Smoker		
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.017 (0.013)	-0.437 (0.257)	0.021 (0.023)	0.010 (0.018)	0.024 (0.03)
Ban*Conscientiousness 80 th decile	-0.007 (0.013)	-0.134 (0.235)	-0.03 (0.026)	0.011 (0.0191)	0.028 (0.029)
Ban*Neuroticism 80 th decile	0.012 (0.012)	-0.105 (0.223)	0.0189 (0.023)	0.004 (0.0168)	0.001 (0.023)
Ban*Extraversion 80 th decile	-0.013 (0.014)	-0.189 (0.225)	-0.008 (0.028)	-0.025 (0.02)	0.009 (0.024)
Ban*Agreeableness 80 th decile	0.001 (0.013)	0.317 (0.232)	0.015 (0.0245)	0.009 (0.019)	-0.026 (0.027)
Ban* Openness Top 80 th decile	-0.002 (0.013)	0.506 (0.231)	-0.014 (0.028)	0.0004 (0.018)	0.008 (0.024)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual i in region r is a smoker at time t . All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 20% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual i . The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table C.2 Effect of being in the top 30% (i.e. the 70th decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes	Smoker		
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.016 (0.014)	-0.371 (0.270)	0.02 (0.025)	0.008 (0.02)	0.022 (0.031)
Ban*Conscientiousness 70 th decile	-0.004 (0.012)	-0.033 (0.207)	-0.031 (0.023)	0.024 (0.017)	0.015 (0.025)
Ban*Neuroticism 70 th decile	0.015 (0.011)	-0.229 (0.201)	0.029 (0.020)	0.001 (0.016)	0.023 (0.021)
Ban*Extraversion 70 th decile	-0.013 (0.012)	-0.078 (0.202)	-0.028 (0.026)	-0.020 (0.017)	0.001 (0.022)
Ban*Agreeableness 70 th decile	0.003 (0.012)	0.313 (0.212)	0.02 (0.022)	-0.003 (0.017)	0.002 (0.023)
Ban* Openness 70 th decile	-0.005 (0.011)	0.125 (0.206)	-0.005 (0.024)	0.007 (0.016)	-0.011 (0.021)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual *i* in region *r* is a smoker at time *t*. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 30% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual *i*. The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table C.3 Effect of being in the top 40% (i.e. the 60th decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes		Smoker	
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.017 (0.015)	-0.242 (0.294)	0.014 (0.027)	0.012 (0.021)	0.021 (0.033)
Ban*Conscientiousness 60 th decile	-0.009 (0.011)	-0.038 (0.202)	-0.029 (0.021)	0.019 (0.017)	0.002 (0.022)
Ban*Neuroticism 60 th decile	0.012 (0.011)	-0.495 (0.193)	0.0335 (0.020)	-0.002 (0.015)	0.016 (0.021)
Ban*Extraversion 60 th decile	-0.018 (0.011)	-0.190 (0.199)	-0.018 (0.023)	-0.021 (0.017)	-0.024 (0.021)
Ban*Agreeableness 60 th decile	0.011 (0.011)	0.378 (0.207)	0.009 (0.0212)	-0.007 (0.016)	0.0480 (0.022)
Ban* Openness 60 th decile	-0.002 (0.011)	0.125 (0.202)	0.014 (0.022)	0.007 (0.016)	-0.013 (0.021)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual *i* in region *r* is a smoker at time *t*. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 40% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual *i*. The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table C.4 Effect of being in the top 50% (i.e. the 50th decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes	Smoker		
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.016 (0.016)	-0.042 (0.337)	0.011 (0.029)	0.009 (0.023)	0.005 (0.037)
Ban*Conscientiousness 50 th decile	-0.02 (0.011)	-0.117 (0.201)	-0.036 (0.021)	-0.002 (0.017)	0.008 (0.021)
Ban*Neuroticism 50 th decile	0.01 (0.011)	-0.528 (0.199)	0.024 (0.020)	-0.009 (0.016)	0.032 (0.021)
Ban*Extraversion 50 th decile	-0.014 (0.011)	-0.294 (0.198)	-0.012 (0.021)	-0.024 (0.017)	-0.008 (0.022)
Ban*Agreeableness 50 th decile	0.018 (0.011)	0.347 (0.209)	0.020 (0.022)	0.01 (0.016)	0.038 (0.022)
Ban* Openness 50 th decile	0.002 (0.011)	0.022 (0.200)	0.014 (0.021)	0.025 (0.016)	-0.019 (0.022)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual *i* in region *r* is a smoker at time *t*. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 50% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual *i*. The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table C.5 Effect of being in the top 70% (i.e. the 40% decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes		Smoker	
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.018 (0.017)	0.090 (0.359)	0.020 (0.030)	0.007 (0.025)	0.003 (0.038)
Ban*Conscientiousness 40 th decile	-0.025 (0.012)	-0.353 (0.215)	-0.061 (0.021)	0.012 (0.018)	-0.010 (0.022)
Ban*Neuroticism 40 th decile	0.014 (0.011)	-0.593 (0.210)	0.019 (0.021)	0.000 (0.016)	0.04 (0.022)
Ban*Extraversion 40 th decile	-0.015 (0.012)	-0.112 (0.206)	0.013 (0.01)	-0.039 (0.017)	-0.008 (0.024)
Ban*Agreeableness 40 th decile	0.02 (0.011)	0.388 (0.209)	0.023 (0.021)	0.008 (0.016)	0.043 (0.022)
Ban* Openness 40 th decile	0.004 (0.011)	0.023 (0.198)	0.013 (0.021)	0.027 (0.017)	-0.016 (0.022)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual *i* in region *r* is a smoker at time *t*. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 60% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual *i*. The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table C.6 Effect of being in the top 70% (i.e. the 30th decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes		Smoker	
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.021 (0.019)	0.269 (0.424)	0.012 (0.033)	0.014 (0.027)	-0.018 (0.042)
Ban*Conscientiousness 30 th decile	-0.030 (0.013)	-0.608 (0.225)	-0.061 (0.022)	0.008 (0.02)	-0.012 (0.023)
Ban*Neuroticism 30 th decile	0.000 (0.012)	-0.691 (0.236)	0.006 (0.022)	-0.013 (0.018)	0.022 (0.024)
Ban*Extraversion 30 th decile	0.003 (0.013)	0.127 (0.227)	0.031 (0.022)	-0.039 (0.018)	0.041 (0.027)
Ban*Agreeableness 30 th decile	0.012 (0.012)	0.408 (0.231)	0.028 (0.024)	0.012 (0.018)	0.006 (0.024)
Ban* Openness 30 th decile	0.007 (0.013)	-0.089 (0.240)	0.009 (0.023)	0.027 (0.019)	0.002 (0.03)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual *i* in region *r* is a smoker at time *t*. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 70% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual *i*. The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.

Table C.7 Effect of being in the top 80% (i.e. the 20th decile) of the Big Five Personality Traits on Smoking using pooled OLS regression, 1991-2008

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Smoker	No. of Cigarettes		Smoker	
			By Generation		
			Hooked Generation	Middle Generation	Informed Generation
Ban	0.036 (0.023)	0.273 (0.524)	-0.003 (0.040)	0.036 (0.034)	0.001 (0.049)
Ban*Conscientiousness 20 th decile	-0.036 (0.017)	-0.047 (0.306)	-0.042 (0.031)	0.010 (0.026)	-0.034 (0.031)
Ban*Neuroticism 20 th decile	-0.004 (0.015)	-0.343 (0.281)	0.007 (0.025)	-0.010 (0.022)	-0.008 (0.031)
Ban*Extraversion 20 th decile	0.021 (0.016)	-0.475 (0.321)	0.048 (0.027)	-0.050 (0.022)	0.111 (0.039)
Ban*Agreeableness 20 th decile	-0.016 (0.016)	0.272 (0.314)	0.013 (0.033)	-0.012 (0.021)	-0.040 (0.029)
Ban* Openness 20 th decile	0.012 (0.016)	-0.142 (0.295)	0.003 (0.025)	0.035 (0.023)	0.001 (0.039)
Observations	60,900	41,584	18,182	27,118	15,600
Number of Individuals	5,487	5,302	1,403	2,234	1,852
Controls	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES

Notes: OLS coefficient estimates are reported, with robust standard errors in parentheses. Standard errors are clustered at the individual-level. The BHPS data set from 1991 to 2008 is restricted to “Ever smokers” that are individuals who have been a smoker in at least one year of the survey and to individuals between the age of 25 and 59. Smoker is a dummy that equals 1 if individual *i* in region *r* is a smoker at time *t*. All Big Five personality variables are standardized with a mean of 0 and a standard deviation of 1. Ban*Big Five personality is an interaction of a dummy variable ban and a personality dummy that equals 1 if the individual is in the highest 80% of that personality trait. Ban equals one if an individual is affected by the ban depending on the time and region of interview of individual *i*. The ban was implemented in 04/2006 in Scotland, 04/2007 in Wales, 05/2007 in Northern Ireland and 07/2007 in England. Control variables include age, age squared, sex, marital status, educational degree, household income, number of children in the household, employment status and immigrant status as well as time and region fixed effects. The Hooked Generation is defined as being born before 1950, the Middle Generation is born between 1950 and 1971 and the Informed Generation is defined as being born after 1971.