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Conscientiousness and occupational prestige as independent predictors of the change of tobacco use in adulthood.

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Abstract

This study investigated the association between childhood intelligence, personality traits, parental social class, maternal smoking, educational qualifications and occupation prestige, and smoking status assessed at different ages. The study was based on a British birth cohort with nine follow-ups. At age 54 years, cohort members provided information on current tobacco use (Yes/No) and the frequency of daily cigarettes smoking. Response of the same questions were also collected four years earlier, at age 50 years. Results showed that among the 5,316 participants with complete data, there was a significant ($p < .001$) decrease in the rates of current tobacco use from age 50 to age 54 years (17.9% and 15.0%). Logistic regression analyses showed that, whilst educational qualifications, occupational prestige, and three of the Big-Five personality traits (Extraversion, Conscientiousness, and Openness) were all significant predictors of current smoking status at age 54 years. After controlling for the initial smoking status, measured four years earlier, only trait Conscientiousness and occupational prestige were significant and independent predictors of the outcome variable. Low intelligence predicted smoking status more than 39 years later, mediated by educational qualifications. Implications and limitations are noted.

Keywords: Tobacco Use; Trait Conscientiousness; Occupational Prestige; Longitudinal

Introduction

What predicts those adults who do, and do not, give up smoking in late middle age? Most smokers reporting wanting to, and often having many failed attempts at, giving up smoking but some succeed while others fail (Slovic, 2001). Many health institutions are extremely interested in this issue as they are eager to help people “kick the habit”. This study examines personality, intelligence, social class and educational qualification correlates of adult smoking in a longitudinal study. We were particularly interested in correlates of those who gave up smoking in middle age.

Personality and Smoking

Various studies that have looked at personality trait correlates of health and illness as well as tobacco usage, though few, have looked at personality correlates of stopping nicotine consumption. Most previous research in the area has established Conscientiousness as a protective factor of health conditions and as a predictor of longevity (Friedman & Kern, 2014). Bogg and Roberts (2004), in a review of 194 studies, found that Conscientiousness-related traits were negatively related to *all* risky health-related behaviours and positively related to *all* beneficial health-related behaviours. They found a correlation of $r=-.14$ between tobacco use and health related behaviours while correlations between ever-smoked, quality and frequency and health behaviours were very similar. They also showed that two facets of trait Conscientiousness, namely industriousness and self-control, were both equally highly correlated with tobacco use ($r=-.21$). While it may be expected that Conscientiousness is correlated with never having smoked it also probably correlates with giving up smoking in later life. We will examine this hypothesis in this study.

Looking specifically at smoking status in a meta-analysis based on 25 studies, Munafò et al. (2007) reviewed 25 studies and found a significant difference between smokers and non-

smokers on both Extraversion and Neuroticism traits. Terracciano, Lockenhoff, Crum, Bienvendu, and Costa, (2008) found that compared to never smokers, current cigarette smokers scored lower on Conscientiousness and higher on Neuroticism. Campbell, Henry, Hammelman, and Pignatore, (2014) however found that smokers had significantly higher qualities of Openness to Experience and a lower levels of Conscientiousness.

There have been speculations on the mechanisms that explain the relationship between childhood personality and adult health status. Hampson, Goldberg, Vogt, and Dubanoski, (2007) showed how children's personality traits have enduring effects that shape adult health and well-being. Specifically, childhood Conscientiousness appears to influence core aspects of adult well-being: health, friendships, and mastery all of which are inter-related.

In a longitudinal study Zvolensky (2015) found higher levels of Openness and Neuroticism were associated with increased risk of any lifetime cigarette use. Neuroticism also was associated with increased risk of progression from ever-smoking to daily smoking and persistent daily smoking. Conscientiousness was associated with decreased risk of lifetime cigarette use, progression to daily smoking, and smoking persistence. These associations between smoking and personality persisted after adjusting for demographic characteristics, depression, anxiety disorders, and substance use problems.

In another longitudinal study based on approximately 4000 adults aged 25–74 who participated in two waves of the Midlife in the US (MIDUS) study, Turiano, Whiteman, Hampson, Roberts, and Mroczek, (2012) examined how personality change and the multiplicative effects among personality traits relate to substance use. They found that higher levels of Neuroticism, Extraversion, Openness, and lower levels of Conscientiousness and Agreeableness predicted longitudinal substance use. Further, increases in Neuroticism and Openness predicted increased substance use while increases in Conscientiousness and Agreeableness predicted decreased substance use.

In an important, recent and comprehensive meta-analysis Hakulinen, Hintsanen, Munafo et al. (2015) looked at nine cohort studies that included 79, 575 adults. They looked personality correlates of smoking status: being a current, ex- or non-smoker, as well as smoking cessation, initiation and relapse. They found that current smoking was associated with higher Extraversion and Neuroticism but lower Conscientiousness. Among the nonsmokers, smoking initiation during the follow-up period was prospectively predicted by higher Extraversion and lower Conscientiousness. Also, higher Neuroticism predicted smoking relapse among ex-smokers. For the smokers, smoking cessation was negatively associated with Neuroticism. They also found that socio-demographic variables did not modify the associations between personality and smoking. Thus, this review highly the role of Neuroticism more than the other big five factors in smoking initiation and cessation.

Overall the personality and smoking literature has revealed somewhat consistent findings showing that those high on Extraversion, Openness and Neuroticism, but low on Agreeableness and Conscientiousness tend to have greatest experience of tobacco usage. Many studies have not taken into consideration other individual difference and demographic factors which could act as moderating or mediating factors, such as intelligence. Through logistic regressions this study looks at the relative effect sizes of personality over other salient variables in explaining smoking behaviour. It should be noted however that effect sizes rather than significant effects tend to be more indicative when sample are large.

Because of the power and consistency of previous results it was predicted that Conscientiousness and Neuroticism would be associated with stopping smoking.

Social Class

The link between socio-economic conditions and health outcomes have been well documented (Marmot, 2007; Wilkinson & Pickett, 2006). According to the British Government Office of

National Statistics long-term smokers bear the heaviest burden of morbidity and mortality related to their smoking habit. Further they are disproportionately drawn from lower socio-economic groups. People in poorer social groups who smoke, start to smoke at an earlier age.

There is also evidence that smoking is associated with education and intelligence. Gottfredson and Deary (2004) have argued that intelligence is a strong predictor of educational outcome which is related to occupational attainment, the measure of social class. Further, more intelligence people tend to lead healthier lives by their lifestyle choices but also have better, less stressful jobs, in healthier work environments. Childhood intelligence is also linked to health outcomes such as coronary heart disease and stroke risk in adulthood (Batty, Mortensen, Nybo Andersen, & Osler, 2005).

In examining the association between childhood cognitive ability, smoking behaviour and socio-economic conditions on premature adult mortality in a British post war birth cohort Kuh, Shah, Richards, Mishra, Wadsworth and Hardy (2009) found that poor childhood and adult socio-economic conditions, lower childhood cognitive ability and cigarette smoking are all associated with adult mortality risk.

The Present Study

The aim of this study was two-fold. First, we examined whether psychological factors (intelligence and personality) not only associated with, but also the independent predictors of, smoking cessation, in a large birth cohort in the Great Brittan. It examined both intelligence and personality (whereas most studies in the area looked at one or the other): it is important to examine the independent effects of these factors on the health outcomes such as tobacco use behaviours. Second, whether personality traits predict the change of tobacco use. We also examined demographic factors like parental social class, educational qualifications and occupation prestige which are modestly inter-correlated.

The hypotheses are based on previous research. It is hypothesised that individuals with higher scores on Extraversion (H1) and Neuroticism (H2), and lower scores on Conscientiousness (H3) with less intelligent (H4) less education (H5) with lower occupation (H6) were significantly associated with smoking behaviour in middle age. Further, traits Extraversion, Neuroticism and Conscientiousness, childhood intelligence, educational qualifications and occupation prestige would be significant and independent predictors of the change (cessation) of current smoking status (H7).

Method

Participants

The study draws on the National Child Development Study 1958 (NCDS) which is a large-scale longitudinal study. NCDS comprises 17,415 individuals who were born in Great Britain in a week in March 1958 (Ferri, Bynner, & Wadsworth, 2003). The following analysis is based on data collected at birth, at age 11, 33, 50 and 54 years. The analytic sample comprises 5,316 cohort members (50.6 per cent females) with complete data. Analysis of response bias in the cohort data showed that the achieved adult samples did not differ from their target sample across a number of critical variables (social class, parental education and gender), despite a slight under-representation of the most disadvantaged groups (Plewis, Calderwood, Hawkes & Nathan, 2004). The focus of the paper was on the data collected when participants were aged 50 and 54 which could be considered a “niche” age spectrum though there is no reason to expect results unrepresentative of participants at other ages.

Measures

1. *Parental Social Class at Birth:* Parental social class at birth was measured by the Registrar General’s measure of social class (RGSC). RGSC is defined according to

occupational prestige (Marsh, 1986). RGSC was coded on a 6-point scale: I professional; II managerial/technical; IIIN skilled non-manual; IIIM skilled manual; IV semi-skilled; and V unskilled occupations (Leete, 1977). This can be treated as either a continuous or a discrete variable

2. *Maternal Smoking during Pregnancy:* At birth mother of cohort members provided information on whether she smoked cigarettes during pregnancy (Yes=1/No=0).
3. *Childhood Intelligence:* Childhood intelligence was assessed at age 11 in school using a general ability test (Douglas, 1964) consisting of 40 verbal and 40 non-verbal items. . Scores from these two set of tests correlate strongly with scores on an IQ-type test used for secondary school selection ($r=0.93$, Douglas, 1964). Scores were standardised with mean=100 and SD=15;
4. *Personality Traits:* Personality traits were assessed at age 50, by the 50 questions from the International Personality Item Pool (IPIP) (Goldberg, 1999). Responses (5-point, from “Strongly Agree” to “Strongly Disagree”) on the 50-item (10-item each) Big-5 personality traits. Alpha was 0.73 for Extraversion, 0.88 for Emotionality/Neuroticism, 0.77 for Conscientiousness, and 0.79 for Intellect/Openness. Standardised were used in regression analysis;
5. *Educational Qualifications:* At age 33, participants were asked about their highest academic or vocational qualifications. Responses are coded to the six-point scale of National Vocational Qualifications levels (NVQ) ranging from ‘none’ to ‘higher degree level’;
6. *Occupational Prestige:* Data on current or last occupation held by cohort members at age 54 are coded according to the RGSC described above, using a 6-point classification;
7. *Tobacco use behaviour:* At age 50 cohort members provided information on current tobacco use status (coded as No=0, Yes=1). Those who answered “Yes” to the

questions also provided information on the frequency of their cigarettes consumption. The same questions on current smoking status and the frequency of cigarettes consumption were asked again four years later when cohort members were at age 54 years, and data were collected and processed with the same recoding.

Data Analysis

To investigate the association between childhood intelligence, personality traits, parental social class, maternal smoking, educational qualifications and occupation prestige, and smoking status in adulthood, first, we examined the characteristics of the study population using ANOVA. Second, we conducted correlational analysis on the measures used in the study. Third, we carried out the hierarchical logistic regression analyses using STATA version 12. Model 1 examined the effects of childhood factors on smoking status at age 54 years; Model 2 examined the associations between adult social and psychological factors and the outcome variable, together with the childhood factors; Model 3 examined the change of smoking status by controlling for the smoking status measured four years earlier, at age 50 years, together with childhood and adulthood factors examined in Models 1 and 2. Gestational age and birth weight were controlled in all three Models.

Results

Descriptive Analysis

The characteristics of the study are shown in Table 1. The rates of current smoking status at age 54 were higher among individuals who came from lower social class, and had lower educational qualifications and occupation prestige. It may be argued there is a possibility with multicollinearity between such variables as parental social class, intelligence, educational qualifications and occupation prestige. Thus a Multicollinearity Test using variance inflation

factors (VIF) was conducted among these variable. If the VIF value lies between 1-10, then there is no multicollinearity, and if the VIF <1 or> 10, then there is multicollinearity. Results showed that there were no multicollinearity among parental social class, childhood intelligence, educational qualifications and occupation prestige (VIF ranged from 1.13 to 1.35).

Inset Table 1 about here

Following this we examined the stability and change of current smoking status and the frequency of daily cigarettes consumption over time and between males and females. First, the correlation of tobacco use over four years from age 50 to age 54 was $r = .77$, showing the stability of tobacco use behaviour. Stability also shown in the frequency of cigarettes consumption between the two time points ($r = .72$, $p < .001$). Second, paired sample t -test showed that there was a decrease in current tobacco use status over a period of four years from age 50 to age 54 (17.9% and 15.0%), and the change was statistically significant ($t(5315) = 8.40$, $p < .001$). There were fewer cohort members who were smokers at age 54 than at age 50 years (2.2% changed from “No” to “Yes” on current smoking from age 50 to age 54 whereas 26.3% change from “Yes” to “No” on current smoking between the two time points).

For the frequency of tobacco use, there was also a significant ($p < .05$) reduction in the number of daily cigarettes consumption from age 50 to age 54 (mean=16.1, SD=7.4 to mean=15.4, SD=7.0; $t(546) = 2.25$, $p < .05$), ranging from 2 to 60 cigarettes per day at age 50 and 2 to 50 cigarettes per day at age 54 for the total sample.

There were no gender differences between men and women in current smoking status. However, there were significant gender differences in the frequency of daily cigarettes consumption at both age 50 and age 54 years. Males had a greater intensity in tobacco consumption than women (mean=16.5, SD=7.9 for men and mean=14.3, SD=6.8 for women;

$t(770) = 4.14, p < .001$ at age 50 years and mean=16.9, SD=7.5 for men and mean=13.3, SD=6.0 for women; $t(625) = 6.67, p < .001$ at age 54 years).

Correlation Analysis

Table 2 shows the correlation matrix of the variables examined. It shows that current smoking status at age 54 were significantly associated with parental social class, childhood intelligence, educational qualifications and occupation prestige ($p < .01$ to $p < .001$). Current smoking status was also significantly associated with traits Extraversion, Neuroticism and Conscientiousness ($p < .05$ to $p < .01$). Thus, H1 to H6 were supported (that individuals with higher scores on Extraversion (H1) and Neuroticism (H2), and lower scores on Conscientiousness (H3) with less intelligent (H4) less education (H5) with lower occupation (H6) were significantly associated with smoking behaviour in middle age).

Insert Table 2 about here

Regression Analysis

Table 3 shows the results of hierarchical logistic regression analyses. Regression analysis has the advantage over regressions for controlling for other factors. Models 1 and 2 show the predictive power of the independent variables in childhood and adulthood on current smoking status at age 54 years; and Model 3 shows the predictive power of the independent variables in childhood and adulthood on the change of smoking status from age 50 to age 54 years, indicated by odd ratios and confidence intervals (CI) respectively.

Model 1 shows that among childhood factors, parental social class and childhood intelligence were significantly associated with current smoking status. Compared with cohort members whose parents had Unskilled occupation at birth, cohort members whose parents had

Skilled non-manual, Managerial/tech, and Professional occupations were 26% to 35% less likely to smoke at age 54 years; and one standard deviation difference in childhood intelligence could make individuals 21% less likely to use tobacco at age 54 years (e.g. cohort members who had intelligence score of 115 at 11 years would be 21% less likely to smoke at age 54 years, compared to cohort members who had intelligence score of 100 at 11 years).

Model 2 shows that after entering adult social and personality variables into the equation, the effects of parental social class and childhood intelligence on the outcome variable ceased to be significant. Higher educational qualifications, compared with no education, higher occupational prestige, and traits Extraversion, Conscientiousness and Openness were significant predictors of the outcome variable. Compared to cohort members who had no educational qualifications, cohort members who had O Level/equivalent NVQ2, A level/equivalent NVQ 3, Higher qualification/equivalent NVQ4, and University Degree/equivalent NVQ 5, 6 at age 33 years were 33% to 78% less likely to smoke at age 54 years; compared with cohort members who had Unskilled occupation, cohort members who had Partly skilled, Skilled manual, Skilled non-manual, Managerial/tech, and Professional occupations were 62% to 70% less likely to smoke at age 54 years.

Model 3 shows that after taking account the effects of initial smoking status measured four years earlier, only trait Conscientiousness and occupational prestige remained the significant and independent predictors of the change of smoking status from age 50 years to age 54 years ($p < .05$ to $p < .0010$). Thus hypothesis (H7) that traits Extraversion, Neuroticism and Conscientiousness, childhood intelligence, educational qualifications and occupation prestige would be significant and independent predictors of the change (cessation) of current smoking status was partially supported. For only two variables, Conscientiousness and occupational prestige were the significant predictors of the outcome variable shown in Model 3, Table 1.

Given the relatively high correlation between childhood intelligence and educational qualifications at age 33 years ($r=.49$, $p<.001$), there would be a possibility that the effect of childhood intelligence on the outcome variable might be mediated through educational qualifications, two mediation tests were conducted on the associations between intelligence and smoking status and smoking cessation with the variable of educational qualifications as the possible mediator. Results showed that the variable of educational qualifications was the mediator of the effect of childhood intelligence on smoking status at age 50 years, indicating that childhood intelligence had an indirect effect on the outcome variable by reducing smoking behaviour mediating through educational qualifications (OR=0.78: 0.72-0.85, $p<.001$ before entering education variable into the equation; OR=0.94: 0.86-1.02, $p=0.13$ after entering education variable into the equation). However, the variable of educational qualification was not the mediator on smoking cessation at age 54, for after taking account the smoking status at age 50, childhood intelligence was not a significant predictor of smoking behaviour at age 54 (OR=0.92: 0.81-1.04, $p=0.18$) without entering the variable of educational qualifications into the equation.

Insert Table 3 about here

Discussion

The current study showed, like others, that psychological factors such as personality traits and intelligence play a role in tobacco use behaviours. Further, trait Conscientiousness is a significant predictor of the change of smoking status.

The correlational results shown in table 2 confirm various previous studies. Less intelligent people with (therefore) fewer educational qualifications and lower occupational prestige were more likely to smoke. Note that in this study intelligence was measured at 11 years old and

may be seen as part cause of later educational qualifications ($r=.49$) and occupational prestige ($r=.35$). Indeed, there is considerable evidence of both the stability of intelligence over time, but also its long-term effects on health and well-being (Deary et al., 2004, 2012).

Three of the five personality variables were significant predictors in the correlational results. Smokers were more likely to be Neurotic Extraverts (Choleric type) who were low on Conscientiousness. There are many speculations in this area, some of which have received empirical support. (Friedman & Kern, 2014). Thus Extraverts are more likely to smoke as nicotine helps their need for stimulation; Neurotics as a way to “calm their nerves” and low Conscientious people because they are less likely to follow medical advice. Equally it may be true that Extraverts smoke more because they socialise with more people, some of whom smoke, and because they develop positive expectations about the positive side of smoking. Similarly it may be that low Conscientiousness is linked to dysfunctional impulsivity and the use of stimulants.

There are, however, other possible explanations. Thus it could be argued that Extraverts would smoke more because they go to parties where most people smoke, or because they develop more positive expectancies about the positive effects of smoking. Many of these explanations are not mutually exclusive and difficult to test (Zvolensky et al., 2015)

As well known among health professionals in addiction behaviours, tobacco use behaviour is fairly persistent (e.g. smoking status shown in the present study with a correlation of $r=.77$, $p<.001$ in a period of four years). Nevertheless, such addictive behaviour is open to change: there was a significant decrease over a period of four years on current smoking. There could be several explanations for such change: government policies made to tackle the harmful behaviour, such as raising the price of cigarettes and educational programme in workplace and communities; efforts of various health service and organisations; awareness and personal

responsibility for one's own health; all of which may play a role in the change of smoking behaviour and smoking cessation.

Although logistic regression (Model 2) shows that educational qualifications, occupational prestige, and traits Extroversion, Conscientiousness and Openness were all significant predictors of current smoking status at age 54 years, it shows (Model 3) that after controlling for the initial smoking status measured four years earlier, only trait Conscientiousness and occupational prestige were the significant predictors of the change of smoking behaviour. Thus these two factors appear to be most salient in smoking cessation. Interestingly Neuroticism is correlated with smoking status but when other factors are controlled its effect disappears.

The effects of Conscientiousness on health has been explored in a number of studies as reviewed (e.g. Bogg & Roberts, 2004), mainly through self-control and following medical advice. The effects of occupational prestige on stopping smoking might be due to workplace regulations and peer pressure.

In this study personality was measured at age 50, four years before the smoking data gathered in this study. There is however a debate as to what extent personality traits are stable over time though there is considerable data to suggest much more stability than change over adulthood (Costa, Herbst, McCrae, & Siegler, 2000).

The logistic regression (Model 2) shows, however, no significant effects found for gender, social class and childhood intelligence on smoking behaviour, although these variables were significantly associated with smoking behaviour (Table 2). Rather, educational qualifications and occupational prestige were significantly associated with smoking status. Mediation test showed that the effect of childhood intelligence on adult smoking status was mediated through educational qualifications, indicating the long effect of childhood intelligence on health outcome as found in previous studies (e.g. Deary, Whiteman, Starr, Whalley, & Fox, 2004; Batty, Mortensen, Nybo Andersen, & Osler, 2005). Further three personality factors were

significant: Extraversion, Conscientiousness and Openness. This partly may be due to the covariance between intelligence and personality (Furnham, 2008) and between parental social class and own occupation.

The logistic regression (Model 3) shows, Conscientiousness and occupational prestige not only were the significant predictors of smoking behaviour at age 54, but also the significant predictors of the change of smoking behaviour. To our knowledge, this is the first study that shows personality trait Conscientiousness predicts the *change* of smoking behaviours. The implication of this finding is that, as Conscientiousness is significantly determined by social factors such as education and social class (Furnham & Cheng, 2014), it is possible to be changed through education (especially in early years) and behaviour therapy. Thus smoking cessation might be more likely to achieve in clinical setting as well as among population when personality has been taken into account.

Tobacco use increases the risk of various health problems and contributes to mortality. Smoking cessation has been the objectives of behavioural scientists as well as health care professionals (Slovic, 2001). Previous studies have shown that both pharmacotherapy and counselling help people quit smoking. In a systematic review based on 117 trials with over 50,000 participants, Silagy, Lancaster, Stead, Mant and Fowler (2004) showed that compared to placebo or to no treatment, nicotine replacement therapy (NRT) had positive effects in aiding smoking cessation. Roberts, Kerr and Smith (2013) have also demonstrated the important role of behavioural interventions in encouraging and supporting smoking cessation attempts.

Limitations

The present study is based on available variables in the dataset rather than being based on the study designed for the purpose. For example, personality traits were measured only once, at age 50 years. It would be more ideal if there were data collected at earlier age. Further whilst

the intelligence test (including both verbal and non-verbal components) was fairly comprehensive the data was assessed once at age 11 years. Generally, the results showed low to moderate effect sizes. Further it would also be desirable to include the same variable in different waves to control for concurrent co-variables and to study growth trajectories. One unanswered question pertains to the generalisability of these findings from this data set to other populations in other countries. Whilst it seems likely that they would generalise to developed world populations it is less clear whether they would generalise to the developing world.

Implications

Given the results one implication for smoking prevention and treatment is to target campaigns at places and media known to attract those of lower social prestige. Thus messages and incentives may be directed to these groups in the imagery and terminology that they most easily accept and process. Further pricing tobacco beyond the means of those with lower incomes may also succeed in reducing its use.

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Table 1. Social and demographic characteristics of the study population and the rates of current smoking status at age 54 years.

	n	%	Current smoking status %
<i>Gender</i>			
Male	2689	49.4	14.9
Female	2627	50.6	15.0
<i>Parental social class</i>			
Unskilled (V)	381	7.2	20.7
Partly skilled (IV)	618	11.6	16.5
Skilled manual (III)	2601	48.9	15.1
Skilled non-manual (III)	585	11.	14.2
Managerial\tech (II)	832	15.7	12.0
Professional (I)	299	5.6	12.7
<i>Educational qualifications</i>			
No qualifications	363	6.8	27.0
CSE 2-5/equivalent NVQ1	610	11.5	23.3
O Level/equivalent NVQ2	1862	35.0	16.9
A level/equivalent NVQ 3	819	15.4	12.6
Higher qualification/equivalent NVQ4	843	15.9	10.4
University Degree/equivalent NVQ 5, 6	819	15.4	6.1
<i>Own current occupational prestige</i>			
Unskilled (V)	110	2.1	37.3
Partly skilled (IV)	614	11.6	19.7
Skilled manual (III)	948	17.8	19.5
Skilled non-manual (III)	1070	20.1	15.2
Managerial\tech (II)	2207	41.5	11.5
Professional (I)	367	6.9	8.4

Table 2. Correlations of current smoking status at age 54 and other variables used in the study.

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11	12
1. Current smoking status at age 54	.15 (.36)	–											
2. Gender at birth	0.49 (.50)	.001	–										
3. Parental social class at birth	3.33 (1.24)	-.054	-.027	–									
4. Maternal smoking during pregnancy at birth	.30 (.46)	.024	.005	-.111	–								
5. Childhood intelligence at age 11	104.0 (12.8)	-.104	.071	.264	-.121	–							
6. Educational qualifications at age 33	2.68 (1.45)	-.191	-.090	.334	-.130	.486	–						
7. Extraversion at age 50	29.44 (6.61)	.059	.069	.034	.036	.022	.076	–					
8. Emotional Stability at age 50	29.11 (7.04)	-.035	-.144	.028	-.014	.078	.084	.224	–				
9. Agreeableness at age 50	36.80 (5.23)	-.013	.396	.040	.015	.110	.069	.359	-.056	–			
10. Conscientiousness at age 50	34.04 (5.28)	-.040	.100	-.002	.006	.022	.051	.146	-.176	.269	–		
11. Openness at age 50	32.58 (5.17)	-.010	-.029	.137	.007	.266	.316	.402	-.103	.328	.220	–	
12. Occupational prestige at age 54	4.11 (1.21)	-.146	.001	.226	-.071	.349	.457	.137	.071	.121	.080	.250	–

Note: Variables were scored such that a higher score indicated being female, a higher rate on current tobacco use status, maternal smoking, a more professional occupation for parents and cohort members, higher scores on childhood intelligence, highest educational qualification, higher scores on traits Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness. Correlations between the outcome variable and a set of other variables examined are in bold. Given the sample size, correlations equal to or greater than 0.03 are statistically significant at $p < 0.05$.

Table 3. Odds ratios (95% CI) for current **smoking status** at age 54, according to childhood and adulthood factors.

<i>Measures</i>	Model 1 Odds ratio (95% CI)	Model 2 Odds ratio (95% CI)	Model 3 Odds ratio (95% CI)	<i>p-value</i> [#]
Sex at birth	1.04 (0.89, 1.21)	1.00 (0.81, 1.23)	0.92 (0.66, 1.27)	0.597
<i>Childhood factors</i>				
Parental social class at birth (<i>unskilled as reference group</i>) at birth				
Partly skilled	0.79 (0.57, 1.10)	0.92 (0.63, 1.35)	1.06 (0.58, 1.93)	0.857
Skilled manual	0.74 (0.56, 0.97)	0.90 (0.65, 1.24)	1.05 (0.63, 1.76)	0.843
Skilled non-manual	0.74 (0.52, 1.05)*	1.02 (0.69, 1.51)	1.07 (0.57, 2.01)	0.830
Managerial\tech	0.65 (0.46, 0.90)*	0.92 (0.63, 1.36)	1.15 (0.63, 2.13)	0.646
Professional	0.70 (0.46, 1.78)*	1.23 (0.75, 2.00)	1.73 (0.79, 3.76)	0.170
Maternal smoking at birth	1.07 (0.90, 1.26)	0.98 (0.82, 1.18)	0.94 (0.71, 1.26)	0.700
Childhood intelligence at age 11	0.79 (0.72, 0.84)**	1.00 (0.91, 1.11)	1.11 (0.95, 1.29)	0.204
<i>Adulthood factors</i>				
Educational qualifications (<i>no qualification as reference group</i>) at age 33				
CSE 2-5/equivalent NVQ1		1.02 (0.71, 1.46)	1.37 (1.10, 3.34)	0.063
O Level/equivalent NVQ2		0.67 (0.48, 0.93)*	1.43 (0.86, 2.38)	0.172
A level/equivalent NVQ 3		0.46 (0.31, 0.67)***	1.11 (0.60, 2.02)	0.744
Higher qualification/equivalent NVQ4		0.43 (0.29, 0.64)***	1.02 (0.55, 1.89)	0.939
University Degree/equivalent NVQ 5, 6		0.22 (0.13, 0.35)***	0.63 (0.31, 1.28)	0.204
Extraversion at age 50		1.25 (0.50, 1.17)***	1.09 (0.93, 1.28)	0.278
Emotional stability at age 50		0.95 (0.87, 1.05)	0.97 (0.84, 1.12)	0.636
Agreeableness at age 50		0.90 (0.81, 1.00)	0.88 (0.74, 1.04)	0.122
Conscientiousness at age 50		0.85 (0.78, 0.94)***	0.85 (0.73, 0.98)*	0.028
Openness at age 50		1.14 (1.03, 1.27)*	1.06 (0.90, 1.26)	0.495
<i>Occupational prestige (unskilled occupation as reference group) at age 54</i>				
Partly skilled		0.42 (0.25, 0.69)**	0.42 (0.17, 1.02)	0.054
Skilled manual		0.47 (0.28, 0.76)**	0.40 (0.17, 0.95)	0.083
Skilled non-manual		0.38 (0.23, 0.63)***	0.34 (0.14, 0.80)	0.094
Managerial\tech		0.32 (0.19, 0.51)***	0.56 (0.20, 0.57)*	0.014
Professional		0.30 (0.16, 0.57)***	0.30 (0.16, 0.57)***	<0.001
Current smoking at age 50			135.8 (101.9, 181.2)***	<0.001

Note: * $p < .05$; ** $p < .01$; *** $p < .001$. Controlling for gestational age and birth weight in all three models. [#] P -values of the final model.