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Essays on smoking inequalities

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UNIVERSIDADE NOVA DE LISBOA
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ABSTRACT

BACKGROUND: Smoking is concentrated in more deprived individuals and the morbidity and mortality associated with tobacco use would consequently be disproportionately distributed across society. This thesis aims to (1) measure the socioeconomic (SE) inequalities in smoking, their evolution over the recent years, and its consequences on health in Portugal; (2) investigate how smoking inequalities emerge, namely during adolescence.

METHODS: Firstly, a SE indicator was built with census data, using factor analyses, and its association with tobacco-related diseases (TRDs) was measured. Secondly, Portuguese SE inequalities on smoking were measured through odds ratios, relative inequality indexes, and concentration indexes. Thirdly, using SILNE survey the association of parental smoking with children smoking was measured, and if the probability of smoking changed with future expectations. Fifthly, if the relations were different across socioeconomic status (SES).

RESULTS: The results showed that the Portuguese SE inequalities in smoking reverted over the 1987 to 2006 period for men, and that there are worrisome inequality trends among the youngest generations. This impacted the prevalence of TRDs in Portugal, with the upper-social-class areas having a lower prevalence of TRDs. The association between parents and children smoking was similar across SES. Expectations about the future were important for smoking, independently of SES.

CONCLUSIONS: Portugal is in an earlier phase of the tobacco epidemic, comparing with other European countries. The similar association between parents and children smoking behaviour across different SES, and the independent effect of future expectations on smoking, only justified the persistence of inequalities, but not their increase.

KEYWORDS: socioeconomic status; inequalities; smoking.

RESUMO

CONTEXTO: O tabagismo está concentrado nos indivíduos mais desfavorecidos, assim como a morbidade e mortalidade associadas. Esta tese tem como objetivo (1) medir as desigualdades socioeconómicas (SE) no tabagismo, a sua evolução nos últimos anos, e as consequências para a saúde; (2) investigar como essas desigualdades surgem na adolescência.

MÉTODOS: Primeiro, foi criado um indicador para o estatuto socioeconómico (SES) com dados dos censos, usando análise de fatores, e mediu-se a sua associação com as doenças relacionadas com o tabaco (TRDs). Posteriormente, as desigualdades SE no tabagismo foram estimadas para Portugal usando odds ratios, índices de desigualdade relativa e índices de concentração. Usando o questionário SILNE mediu-se a associação entre o tabagismo dos pais e filhos, e se a probabilidade de fumar era influenciada pelas expectativas de futuro. Por último, se estas relações diferiam com o SES.

RESULTADOS: Os resultados mostraram uma inversão das desigualdades nos homens portugueses (1987-2006), e tendências preocupantes nos jovens. As desigualdades tiveram um impacto na saúde: áreas com SES superior tinham menor prevalência de TRDs. A associação entre tabagismo de pais e filhos e expectativas de futuro tiveram um papel relevante no tabagismo, independentemente do SES.

CONCLUSÕES: Portugal encontra-se numa fase anterior da epidemia tabágica, comparando com os restantes países europeus. O facto da associação entre o tabagismo dos pais e dos filhos ser semelhante nos vários SES, e o efeito das expectativas futuras no tabagismo ser independente do SES justifica uma persistência das desigualdades e não o aumento observado.

PALAVRAS-CHAVE: estatuto socioeconómico; desigualdades; tabagismo.

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LIST OF ABBREVIATIONS

95%CI	95% Confidence Intervals
ACSS	Administração Central do Sistema de Saúde [Central Administration of the Health System]
AP-DRG	All Patient Diagnosis Related Groups
ATE	Average Treatment Effects
BE	Belgium
CI	Concentration Index
DE	Germany
FAS	Family Affluence Scale
FI	Finland
HBSC	Health Behaviours in School Aged Children
HIV/AIDS	Human Immunodeficiency Virus Infection/Acquired Immune Deficiency Syndrome
ICD-9-CM	International Classification of Diseases, Ninth Revision, Clinical Modification
IT	Italy
IV	Instrumental Variable
NHIS	National Health Interview Survey
NHS	National Health Service
NL	The Netherlands
OECD	Organization for Economic Co-operation and Development
OR	Odds Ratio
PT	Portugal
RII	Relative Index of Inequality
SDI	Standford Dependence Index
SE	Socioeconomic
SES	Socioeconomic Status
SILNE	Tackling socio-economic inequalities in smoking: learning from natural experiments by time trend analyses and cross-national comparisons
SSP	Subjective Social Position
TORA	Theory of Rational Addiction
TRDs	Tobacco-Related Diseases
WHO	World Health Organization
INE	Instituto Nacional de Estatística [Statistics Portugal]

1 FOREWORD

Smoking is bad for health. It is associated with many diseases, reduced quality of life, and early death. Estimates are that almost 450 million adults will have died worldwide due to tobacco from 2000 to 2050 ¹. Yet, despite the very consistent evidence, despite the quickly growing information in the population, and despite the many anti-tobacco policies everywhere, smoking remains common. Globally, it is estimated that more than 600 million people smoke daily ², and that tobacco consumption is disproportionately present among the worse-off, with dramatic consequences on health inequalities. This “smoking paradox” – the persisting adoption of a knowingly lethal behaviour – indicates that much remains to be understood about smoking habits and about the effective policies to reduce it. This thesis contributes to the vast but still very incomplete research on tobacco consumption.

The thesis is organized as follows. In an introductory chapter, some stylized facts about smoking and its social patterning, and an overview of the theories of smoking are presented. The third chapter describes the objectives of this thesis. The fourth chapter mentions the databases used and the ethics procedures. The fifth chapter is devoted to a comprehensive analysis of smoking-related socioeconomic (SE) inequalities in Portugal. The first section measures the evolution of SE inequalities in smoking between 1987 and 2006, and the second measures the SE inequalities in tobacco-related diseases (TRDs). Our findings first highlight the high magnitude of inequalities in TRDs amongst the worse-off, providing evidence about the link between SE inequalities in smoking and SE inequalities in health. Results also indicate that smoking was more common among the better-off in the 1980s, but that inequalities later reversed, so that smoking in Portugal is today more prevalent among the worse-off. The analysis reveals the existence of marked SE inequalities amongst the youngest cohorts, when adult lifestyles start to be defined, with consequences on health and its social patterning, and when anti-tobacco policies are potentially more effective. Following this result, the sixth chapter focuses on youth smoking, with the first section measuring the influence of parental exposure to smoking on adolescents’ smoking behaviours, and their role in explaining SE inequalities among adolescents. Then, the second section analyses how expectations about future life and health shape adolescents’ lifestyles. Results show that parents’ smoking behaviour is strongly associated with adolescents’ smoking, and that unhealthy lifestyles, such as smoking, nicotine dependence, binge drinking, and cannabis use, are related to adolescents’ poor expectations about the future.

These findings help to explain the SE inequalities in smoking. On the one hand, underprivileged adolescents are more exposed to parental smoking behaviour. On the other hand, future expectations are socially patterned. Finally, in the seventh chapter the main results are discussed, the main limitations and strengths are presented, and policy implications and suggestions for future research are revealed.

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- Alves J, Nunes C, Perelman J. Socio-economic inequalities in tobacco-related diseases in Portugal: an ecological approach. *Public Health*. 2015.³
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Additionally, the following manuscript was submitted to *Journal of Public Health*, and it is currently under revision:

- Alves J, Perelman J, Soto V, Federico B, Richter M, Rimpela A, et al. Adolescent smoking and its social patterning in six European cities: the role of parental smoking. *Journal of Public Health*. Submitted in September, 2015.

2 INTRODUCTION

2.1 SMOKING AND INEQUALITIES

2.1.1 Smoking behaviours: stylized facts

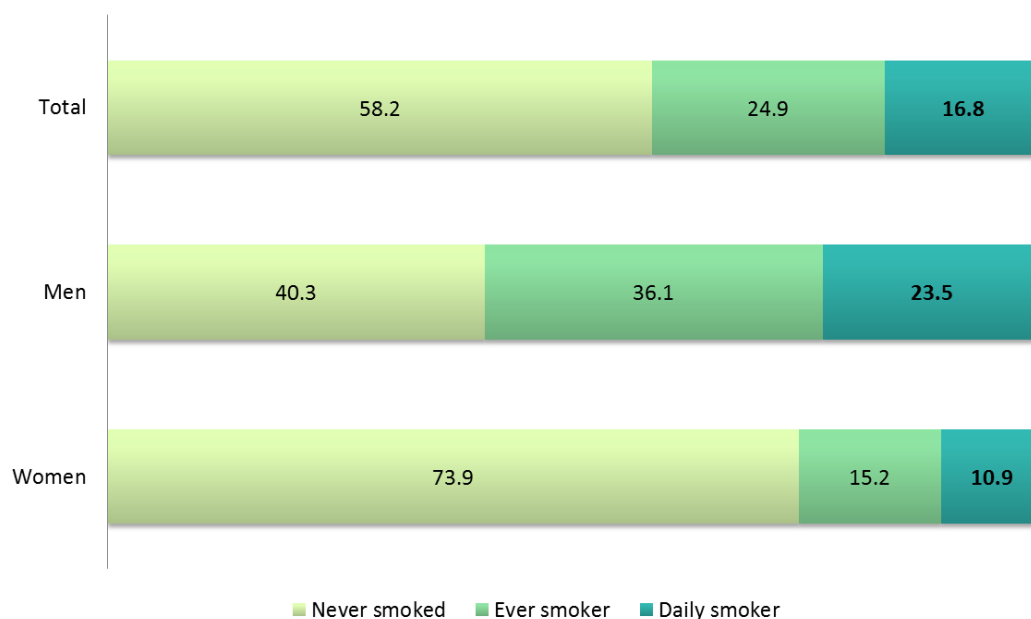
In 1950 the first causal evidence appeared that tobacco was prejudicial: several case-control studies associated the use of tobacco with lung cancer ⁵. Today, it is known that tobacco affects almost every organ of the human body ⁶, causing a wide range of diseases, such as cardiovascular diseases, neoplasms, respiratory diseases, and many other. In addition, smoking has negative externalities to those exposed to second hand smoke, causing cancer, and respiratory and cardiovascular diseases. Tobacco is one of the greatest avoidable causes of death ⁶, and is responsible for the death of 6 million people worldwide each year, 800,000 of which are in Europe and 11,000 in Portugal ⁷. Smoking (including second hand smoke) is the second highest risk factor for global disease burden, surpassed only by high blood pressure, and is associated with 156,838 disability-adjusted life years ⁸. In Portugal 11.7% of deaths are attributable to smoking, and 72,126 disability-adjusted life years are attributable to smoking related illnesses ⁹. The observation of a cohort of 34,439 male British doctors led to the conclusion that smokers died on average 10 years earlier than never smokers ⁵. Continued tobacco use tripled age specific mortality rates in those doctors. Nevertheless, the authors discovered that quitting smoking decreases the hazard: cessation at 50 years old decreased the excess mortality risk to one half, and those who quit at the age 30 had almost the same probability of early death as non-smokers.

The illness and mortality arising from smoking also represent a financial burden. For example, from 2006 to 2010 the United States spent \$170 billion per year with the treatment of TRDs. This corresponded to 8.7% of the annual healthcare spending, more than 60% of which was supported by public health insurance systems ¹⁰. The TRDs also brought productivity and income losses to individuals who smoke and to their families. Comparing with non-smokers, smokers have an additional 33% risk of absenteeism ¹¹, and receive 8% to 24% less income ¹².

Still, in 2012 the global prevalence of smoking was about 21% among the population older than 15, and was higher for men (36%) than for women (7%) ¹³. Although the global age-standardized prevalence decreased in the period of 1980 to 2012, the number of smokers and cigarettes smoked increased ². Globally, in 2012 there were 627 million daily smokers ². However, differences across regions are striking: in 2012,

the highest male prevalence in Europe was 40% (Serbia), whereas the lowest prevalence among men was 0.4% (Azerbaijan) ¹³. Evidence available for Portugal is mainly based on National Health surveys and small regional samples. The Portuguese prevalence in 2005/2006 in the population older than 15 was 30.6% among men and 11.6% among women ¹⁴. A review of the literature from 2005 showed that women's consumption was still increasing, unlike that of men ¹⁵. The preliminary values of the fifth National Health Interview Survey (NHIS) from 2014 (Figure 1) point to a decrease among men (23.5%), and a stabilization for women (10.9%) ¹⁶. According to 2012 Eurobarometer ¹⁷, Portugal was amongst the countries with the lowest percentage of former smokers (12%). Portugal had also one of the youngest regular smoking starting age (16.9 years old versus 17.6 of EU28), matching Denmark and the United Kingdom, and being surpassed by only Spain (16.7 years old).

Figure 1. Portuguese prevalence of smoking in the population older than 15, 2014 (estimated).



Source: Instituto Nacional de Estatística; 2015. ¹⁶.

The 2005/2006 Health Behaviour in School aged Children (HBSC) found large differences in youth smoking prevalence between countries ¹⁸. Among the countries studied, the youth smoking prevalence was highest in Bulgaria, with 31.8% of students smoking weekly (27.5% among boys and 35.9% among girls), and lowest in Sweden, with 8.5% of students smoking weekly (7.8% among boys and 9.3% among girls). According to the same survey, among the Portuguese adolescents, the prevalence was of 10.4% of weekly smokers (8.7% among boys and 11.7% among girls). The prevalence numbers were already worrisome at these ages, especially because

evidence shows that early tobacco use is related with adult smoking and nicotine dependence ¹⁹.

Since the first sign that tobacco was prejudicial to health, being responsible for mortality and morbidity, a great deal of evidence has been amassed. However, the use of tobacco is still widespread around the world. The number of smokers is high and the number of former smokers is not decreasing at the expected rate, as is the case in Portugal. Besides, the non-negligible prevalence in the younger ages indicates that the worrisome trends would not reverse in the near future.

2.1.2 Smoking inequalities: stylized facts

Not only is the prevalence high, but it also does not affect all individuals equally or at the same pace. A model of “tobacco epidemics”, developed by Lopez, Collishaw and Pihl ²⁰ shows smoking trends in populations over time ²⁰. Based on smoking prevalence surveys, the authors modelled four stages of the evolution of smoking epidemics. In the first stage tobacco becomes socially accepted and countries are characterized by a rising male prevalence. In the second phase male prevalence reaches a peak (around 50 to 80%) and prevalence among women increases rapidly. In this phase prevalence may be higher in individuals with more education. As the health hazards of tobacco become known the third phase is characterized by a decrease in prevalence for males. Female prevalence reaches a peak (around 35 to 45%). Typically, the more educated are more susceptible to health promotion policies, and more likely to stop. In the last phase of the model, smoking becomes a common behaviour in low educated individuals, which explains an increase of smoking inequalities.

The applicability of this model was recently questioned by Thun et al. ²¹, who suggested that alternative pathways are needed in order to better account for gender and cultural differences. Despite the recent criticism, for many years the original model helped to describe the differences on prevalence between developed countries. In particular, it helped to put forward an explanation of SE inequalities in smoking, which is the main focus of this thesis. Also, the model suits the empirical evidence very well. Indeed, prevalence of risk behaviours, like smoking or alcohol use, is more common in low SE groups ^{22,23}, and in some European countries smoking habit is growing in low SE groups. Individuals with less education and income smoke more cigarettes per day, have high probability of smoking, and have higher initiation and lower cessation rates ²⁴⁻²⁶.

An international comparison of surveys from 12 countries showed that in 1990 smoking prevalence was higher amongst the lower educated, despite the international variations²⁷. In most European countries, among the younger people the inequalities in smoking are in favour of the higher educated, with the exception of Greek and Portuguese women²⁸. A study for Italy showed that in recent years, the gap between the high and low educated increased, especially among the youngest generations²⁹, mainly due to widening inequalities in initiation. More recently those inequalities were observed across all age groups³⁰, due to inequalities in initiation and cessation³⁰. In Spain the prevalence among males was more concentrated among the lower SE groups, while women just recently have begun to experience this transition to lower SES, due to higher inequalities in quitting rates³¹.

Beyond the association between smoking and SES, several authors have demonstrated a causal relationship between education and tobacco use, using longitudinal designs. A US prospective study showed that lower SES individuals were more likely to start smoking, to become regular smokers, and to quit less³². The same study showed that the effect of SE conditions over the life course accumulates over the lifespan smoking status, as smoking was associated with the SES measured 13 years later. Also, in a British sample of individuals persistent smoking from adolescence to adulthood (stable smoking habit at 41 years of age) is different according to adult and childhood SES, especially among women³³.

The prevalence of smoking is concentrated amongst the low SE groups in most of the European countries, mainly due to inequalities on smoking initiation and cessation. The southern European countries were the exception during several years, but the reversal of inequalities has taken place only recently. In addition, the younger generations show disturbing signs of unequal behaviours that might perpetuate SE inequalities.

2.1.3 The challenge of smoking inequalities

Inequalities in smoking are a major public health problem. As smoking is a cause of mortality and morbidity, the social patterning of smoking will be translated into inequalities in health and life expectancy. Lynch *et al.*³⁴ showed that risk factors are largely responsible for the SE differences in mortality: the adjustment for behaviour risk factors (smoking, alcohol consumption, physical activity) decreased the excess relative risk of all-cause mortality by 35% in the lowest quintile of income³⁴. The excess risk in mortality can be explained by differences in risk behaviours, amongst other risk factors, whereby target low SE groups can reduce the disease burden in low SE individuals.

Hence, tobacco is an epidemic that is spread all over the world, which kills and is responsible for several diseases, and affects more deprived individuals. As public health cares with the population as a whole ³⁵, if some groups of society are being deprived of achieving their potential health, this is a public health problem. Reducing smoking inequalities may thus contribute to a fairer society as most of time these inequalities are actually unfair and avoidable. They are unfair because the burden of disease disproportionately affects certain groups of society, assailing the principle that people should have the same opportunities of having a good and healthy life. They are avoidable because richer and more educated people live more and have healthier lives than those in lower positions of society, and the mortality and morbidity that the latter are subject to can be, at least to some degree, curtailed. The society is living below the optimum levels of social welfare, and increasing equality levels would ultimately improve the overall health status of the population, either by the improvement of the worse-off health conditions, or by reducing negative health externalities ³⁶. Woodward stated four reasons for reducing health inequalities: (i) most health inequalities are not simply differences among health status, they are actually unfair; (ii) some diseases constitute a danger to the people around (this is also true for risk behaviours if we consider for example the exposure to second hand smoke); (iii) it is possible to take measures to improve health and simultaneously reduce inequalities; (iv) there are already proven cost effective interventions to tackle inequalities and, thus, it is still possible to reduce inequalities at a price that society is willing to pay.

Summing up, the smoking inequalities are unfair, since they disproportionally affect the most vulnerable strata of the population, and could be avoided through measures that cost-effectively target the reduction of inequalities, besides reducing prevalence.

2.1.4 The strategies to reduce smoking and its social patterning

To reduce tobacco consumption the World Health Organization (WHO) adopted a Framework Convention on Tobacco Control in 2003 ³⁷ in response to the tobacco epidemic. It was an evidence-based treaty for the promotion of public health and international cooperation for tobacco control. The WHO convention suggested effective interventions to reduce demand for tobacco products and restrict supply. It proposed the increase/introduction of price and tax over tobacco products to reduce its demand. Also, the ban in indoor workplaces, public transports, and public places; the regulation of the contents of tobacco products, and information disclosure; the inclusion of the tobacco harm on packaging and labelling; and the restriction of information that could be misunderstood (for example, the term 'light'). The framework encouraged education, communication, training, and public awareness regarding the risks of tobacco use and

exposure, and the benefits of quitting. Additionally, it promoted banning tobacco advertising, promotion and sponsorship, and demand reduction measures. Regarding the supply side, the framework recommended the elimination of illicit trade in tobacco products, sales to and by minors, and the provision of support for alternative activities for tobacco workers. In the same year, the World Bank presented six highly cost-effective interventions to reduce death and disease caused by tobacco use: to increase taxes on tobacco products, implement bans or restrictions in public and work places, ban advertising and promotion of all tobacco products, inform better and improve knowledge about health risks and attitudes to smoking, provide large, direct warning labels, and help smoking cessation ³⁸.

Nevertheless, the introduction of population level non-targeted interventions to reduce tobacco prevalence can produce unexpected effects on SE inequalities, and may ultimately widen the inequality problem ³⁹. There is still scarce evidence regarding the effect of population wide interventions on smoking social patterning. Among the several measures, increasing prices and/or taxes over tobacco related products was the one that most consistently showed an effect of reducing SE inequalities among adults ⁴⁰ and youths ⁴¹. By contrast, non-targeted smoking cessation programmes may actually widen SE inequalities, since only the high SES smokers will enjoy the benefits of the programmes ⁴². Another effective intervention was the one applied by the United Kingdom NHS stop-smoking services. By targeting the low SES smokers, they were able to reduce inequalities ³⁹. Better educated individuals can benefit more from anti-tobacco campaigns and health promotion programmes than low educated. The reasons are related with the easier access to information, higher understanding capacity, and higher valuation of future periods ⁴³. Thomas *et al* ⁴⁴ state that (i) price increases may be more effective in low income adults and those in manual occupations, (ii) higher education makes people more responsive to price changes in tobacco, and (iii) there is no evidence that changes in tobacco prices have different responses in children from different family backgrounds (measured by income, occupation, or educational level).

Despite these advances, there are still some gaps in the knowledge about the policies' consequences, especially about inequalities mechanisms. Better knowledge of the social patterns of smoking, and more information about the trends are essential to decide the best way and moment to intervene, as some policies may actually harm inequalities.

2.2 THE THEORIES OF SMOKING

In economics the decision is up to consumer, which requires rational and informed choices and knowledge of the risks and costs. If smoking causes disease and this information is widely spread, why do people still smoke? Why do they rationally engage in self-destructive behaviours?

2.2.1 Economic theories of smoking

The Grossman model of human capital is the foundation of health behaviour economic modelling ⁴⁵. It was developed by several authors and is still in use today. According to the human capital model people receive an amount of health when they are born, a health stock, which depreciates with age, and they seek to maximize the present discounted value of lifetime utility. If the health levels fall below a minimum, the person dies. However, people can invest in health, increasing the health stock. Thus, life expectancy and health will result from investment choices, regarding time and money. Healthy lifestyles are viewed as an investment that is able to increase the stock of health, allowing for a longer and healthier life. However, these investments are costly because they are time consuming, expensive, or require the sacrifice of immediate pleasure. People will invest in health behaviours if the returns on investment equal the opportunity costs of health capital, in other words, when the marginal costs of smoking, such as cigarette prices, short life expectancy, and lower health, equal the marginal benefits, such as the immediate pleasure derived from smoking ⁴⁶. On the basis of this simple, initial model and its further improvements, five explanations can be found for smoking behaviour.

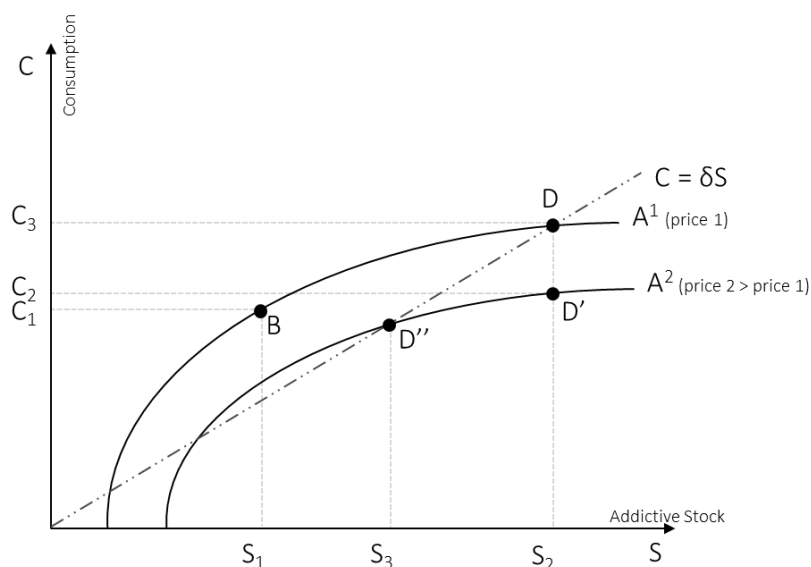
First, since most of the health benefits are obtained in the future, those levels of investment depend on people's time preferences. More patient people attribute a higher weight to later periods' utility, and will sacrifice current utility in favour of long-term benefits ⁴⁶. On the contrary, less patient people will value more unhealthy activities that give greater immediate pleasure, even knowing that it will have a negative impact on future health. Thus, the time preferences might influence the smoking decision. This is nicely illustrated in the well-known marshmallow test, applied to pre-schoolers. The test, developed by Mischel Ebbesen and Raskoff Zeiss ⁴⁷, seeks to measure the capacity to resist temptation and delay pleasure among children. When getting older, the participants with more self-control in childhood had more ability to contradict impulses and had more protective health behaviours. The capacity to delay gratification was related to better academic achievement, self-worth, higher stress

copying, and less substance abuse ⁴⁸. Less patient people may therefore be more tempted to smoke.

Second, individuals may have different discount rates for different periods ⁴⁶, discounting more the near future than the long-term future (hyperbolic discounting). This will make quitting now more difficult than at an older age, and make it hard to establish binding promises in the future. Smokers may thus decide to quit now, but when the date of quitting is reached abstinence becomes less attractive than smoking, and they prefer to procrastinate quitting. The inconsistent preferences are especially important in youth⁴⁹. Firstly, youths may over-discount the future, since they suffer from “myopia”. Secondly, they think that they will have the same preferences in the future, not considering that in the future they might regret some present decisions.

A third explanation is rational addiction. The Theory of Rational Addiction (TORA) model was introduced by Becker, Grossman, and Murphy ^{50,51}. The individuals incorporate several period's consumption levels, prices, and stock of past consumption in their present discounted value of lifetime utility ⁴⁶. The term S is seen as an addictive capital stock (smoking), for the consumption levels given by C (cigarettes). The smoker will smoke more in higher levels of stock, and current consumption increases the stock of addictive capital. This suggests that there are endogenous preferences across several periods linked to past consumption levels. The steady state is when the consumption levels are high enough to equal the depreciation of the stock of smoking capital (given by $C = \delta S$). When consumption is above the steady state (case of B) the stock will increase, because consumption is higher than depreciation, until it reaches a higher value (D). The model allows making several conclusions. For example, the effect of a price increase is described in Figure 2. A price increase will induce an increase from A^1 to A^2 . D , the original equilibrium, changes to D' , and lowers consumption. Since D' is below the steady state, the stock of the addictive good decreases into D'' , with consumption C^4 and stock S^4 . The TORA model shows that it is possible to rationally choose to smoke. The smoker incorporates information about the past, present, and future to make his smoking decision, weighting the pleasure of present smoking, with the future health loss, and the impact of current levels of consumption in the future, and also answers to incentives, such as rising prices.

Figure 2. Rational addiction model



Fourthly, in order to make the best possible investments, individuals have to weigh the costs and benefits of smoking. However, some people are excessively optimistic, i.e., they are very positive about the consequences of smoking on their health. Thus, the costs and benefits of smoking might not be accurately estimated, which makes them more prone to smoke. Literature shows that smokers underestimate the impact of their smoking habits on health, and overestimate their life expectancy. According to Smith *et al.*⁵², the way information influences longevity expectations differs between smokers and non-smokers. When facing a general health shock, smokers revise less beliefs about life expectancy less than non-smokers. However, smokers adjust their expectations when facing smoking related health shocks, reducing the expected chances of living until age 75.

Finally, brain processes are very complex, and may lead people to make mistakes. For example, when emotional thinking overcomes rationality, people “forget” to maximize their lifetime utility, i.e., to increase their health levels. Instead, they are affected by transitory states that sometimes require the immediate pleasure of smoking. Hence, individuals are aware of the tobacco harms but do the opposite to the “correct thinking”, influenced by those transitory emotional states⁴⁶.

To conclude, on the basis of Grossman and successors, people may smoke because of: (1) time preferences; (2) hyperbolic discounting; (3) rational addiction, and (4) irrational thinking and mistakes.

2.2.2 Sociological theories of smoking

Sociological theories state that smoking is also a social habit rather than only an individual decision. Cawley and Ruhm⁴⁶ summarize the main reasons for the observed correlation of smoking behaviour between group members. Individual expectations may be updated by observing the effects of smoking on peers, since expectations are made according to observation of others' actions and models^{53,54}. Also, individual choices are affected by others either because utility of smoking is increasing in peer smoking, or even because social interactions could result in modification of individual preferences.

A group is delineated by participation in common activities, specific verbal and nonverbal communication ways, use of specific spaces, or even shared behaviours such as smoking or substance use⁵⁵. In order to participate in some group, an individual has to commit to the shared behaviours, for example to smoke. Thus smoking may ultimately contribute to the definition of a group, design its values and determine its cohesion. However, the individuals that are isolated from groups might also be more likely to become smokers⁵⁶. Several reasons have been suggested: isolated individuals may be subject to the influence of the closest friend than the members of a group, the stress caused by isolation can precipitate smoking, and on the contrary, the fact that those individuals smoke could lead them to be ostracized from a group⁵⁷.

Exogenous or environment characteristics of the group may also have an impact on individual behaviour⁴⁶. For example, having older peers who already smoke may trigger smoking initiation, or having friends with similar family background, which is associated with smoking, could influence them share the same smoking behaviour. Another reason is that people may join groups with similar habits, becoming friends because they frequent the same smoking-friendly environments, e.g., go to cafes that sell tobacco products⁴⁶.

Related to the social theories of smoking, recent literature has examined the influence of the living place on smoking behaviours. Firstly, if the number of smokers is very high in the neighbourhood, the peer effects may be stronger, and thus the norm in that neighbourhood is to smoke. Secondly, neighbourhoods can impose competing or alternative models of behaviour⁵⁸. Thirdly, people living in a given place might share similar characteristics linked to smoking⁵⁹, for example, sharing a religious belief that discourages unhealthy lifestyles, such as smoking. Fourthly, there are independent area and contextual effects, such as higher deprivation or affluence^{59,60}, and also

policy matters such as those regarding tobacco prices or legislation about vending machines ⁶⁰.

The aspect of socialization is particularly important among adolescents. The effect of peers in adolescent tobacco use is widely studied in the literature ^{53,61,62}. Adolescents are influenced by peer pressure, friend's offers of cigarettes, and by sharing compliance and support ⁶³. It is also known that adolescents with smoking parents have a higher propensity to select smoking friends, although smoking parents do not seem to increase susceptibility to peer pressure ⁶⁴.

Concluding, smoking is a social behaviour because of peer influence, through forming different expectations, changing individual preferences, by definition of group membership, and/or by shared environments or neighbourhoods.

2.2.3 Psychosocial theories of smoking

Psychosocial factors are also known to determine smoking habits, in particular stress and coping. Stress environments, especially those suffered at school and family, are linked to the risk of smoking onset among adolescents ⁶⁵. Experimental smoking was also related to depression and anxiety, and these also increased susceptibility to peer smoking ⁶⁶. Smoking is a way to cope with or relieve stress since nicotine can moderate the stress levels ⁵⁴.

Theories also highlight the role of future expectations. Expectations about the future influence the setting of goals and planning, and thus regulate attitudes and emotional well-being ⁶⁷. Adolescence is a developmental transition period, favourable to future planning and self-definition ⁶⁸. The existence of unfavourable future expectations might create negative feelings of despair and the notion of lack of control, thereby promoting the adoption of risk behaviours. For example, low perceived survival expectations have been associated with heavy drinking, smoking, and substance abuse ⁶⁹.

Among girls, the effect of smoking on weight might be a determinant factor for initiation. In a 1997 cohort of 9,022 American adolescents, girls that had a high body mass, who perceived themselves overweight or that reported intentions to lose weight were more likely to start smoking than others ⁷⁰. The effect of weight for boys was not significant. Also, the expectations about weight gain can prevent smokers from quitting smoking. The higher levels of food intake and lower spending of energy could increase body weight after smoking cessation ⁷¹.

Thus, smoking can result from psychosocial reasons, such as stress and coping, expectations, and as weight control (among girls).

2.2.4 Biological mechanisms

Smoking behaviour is also related with genetic factors. The parents and children may have similar reward from nicotine, susceptibility to addiction, and share the same pharmacotherapy response ^{72,73}, which may be important for smoking cessation, for example. Using twins, researchers have showed that genetics explains approximately 50% of smoking behaviour, and that genetic factors are more important in smoking initiation than in persistence ^{72,74}. Nevertheless, living in step-parent families has effects on smoking that are similar to living with biological parents, which supports the fact that exposure to smoking parents is crucial *per se* in smoking behaviour ⁷⁵.

Another biological mechanism is physical addiction. Once people try cigarettes it is difficult to stop. The addiction has three main characteristics: reinforcement, tolerance, and withdrawal ^{46,54}. Reinforcement means that marginal utility of current consumption is increasing on past stock of consumption. Thus, the consumption of cigarettes is increasing over years, and smoking cessation is more difficult for people who smoked more in the past. Tolerance refers to the decreasing utility of current consumption with the higher stock of past consumption. In other words, heavy users have lower utility of consumption now than in the past, and the smoker therefore has to consume higher amounts of tobacco to reach the same effect. Finally, withdrawal, i.e., utility is increasing on current consumption. Addicted people prefer to keep consuming since the abstinence may generate unpleasant symptoms (such as irritability, anxiety, or weight gain).

Smoking is thus a biological mechanism as a tendency for it can be genetically inherited from parents, and it generates a physical addiction.

2.3 THE THEORIES OF INEQUALITIES IN SMOKING

Even though smoking is an expensive behaviour, the prevalence remains high among people with low-SES. Smoking is not only a matter of choice. Health decisions, and ultimately adult health, are shaped by life course environment and experiences ³⁶, which make less privileged people more vulnerable to tobacco use.

2.3.1 Economic theories of smoking inequalities

Amongst health economists, the main reason invoked for the smoking differences is education. Education was widely studied in the context of the Grossman model. According to the model education increases productive efficiency, which means that using the same health inputs (treatments, healthy lifestyles), high educated people

produce more health than low educated people. As a consequence, they are more prone to invest in healthy lifestyles because of the higher expected reward. This greater efficiency is related to several factors, which we detail below.

First, education might influence time discounting, i.e., more educated may give more weight to future periods than less educated ⁴³. The higher educated will be more inclined to invest in future health since they will have a long-term vision. Education may also make the individuals more risk averse ⁷⁷. The higher educated might dislike the risk behaviours more either because they are more aware about the health consequences of smoking or because they have more to lose. On the contrary, the more deprived are more focused on current problems, such as making ends meet, having no time left to think about the future ⁷⁶.

Second, education gives access to basic knowledge, through reading and writing skills. Namely, it increases the awareness about the consequences of health behaviours, better understanding of treatment and medical care, and facilitating access to health services ⁷⁸. For example, better educated people might have the capacity to understand anti-tobacco campaigns and adhere to cessation programmes, and quit more. In fact, higher educated individuals respond quickly to the gradual arrival of the information about the dangers of tobacco ⁷⁹. By improving qualifications education increases the employment possibilities, which increases present choices, resources, and outcomes. Education allows access to better paid jobs, more security, and access to better health insurance packages ⁷⁷. However, there is an independent effect of education and income, after controlling for both ²².

Third, education influences the cognitive function and critical thinking ⁷⁷. Thus, better educated people appear to have higher efficacy in learning. More educated people react more rapidly to information, since they understand immediately the risks of smoking, leading to an increase in inequalities ⁷⁹. Thus, alerts to the dangers of smoking might be more effective among high educated. Education improves communication skills, and consequently receptivity to health messages ⁸⁰. This is particularly important when information is limited or the message is not easy to understand. For example, seduced by advertising, a low educated smoker can buy "light" cigarettes assuming that they decrease tobacco's harm, although he cannot evaluate them properly.

Fourth, the more educated trust more in science and are more likely to use more advanced technology ⁷⁷. The higher capacity of self-managing and the better understanding of new developments and discovery might make them more able to

choose not to smoke or stop smoking. Furthermore, they are more aware of technologies to commit to the decision of quitting, e.g. the most effective drugs to help smoking cessation.

Income is also relevant in explaining SE inequalities in smoking because it might reflect, for example, the ability to pay for goods ⁴³, whether they are health improving (as cessation consultations) or health damaging (as tobacco products). However, the effect of income is complex because income changes across the lifespan, includes several components that sometimes are not easy to understand, and usually is subject to a high nonresponse rate ⁸¹. However, the volatility of income can be relevant by itself, since short-term influences, such as macroeconomic cycles, might affect health behaviours. In fact, evidence suggests that people smoke less in economic downturns, probably because they have less money to spend on tobacco (full wallet effect), or they have time constraints, since they have to dedicate more time to work and less to tobacco consumption ⁴⁶. Also, individuals' short-term gains also most probably influence unhealthy habits. For example, lottery winnings increase the consumption of cigarettes and the frequency of social drinking ⁸².

In addition, the prices from consultations to help smokers to quit and medication necessary to avoid withdrawal symptoms that result from smoking cessation can exclude the possibility of quitting amongst the low SE groups. Also, attempts to control weight gain with smoking cessation could be costly, and not accessible to all classes. In fact, SE differences were found amongst the methods used to quit smoking ⁸³. Thus, as low SE individuals can't access only low-cost or low-effective methods, inequalities may arise. Another source of inequalities is the possibility of different exposure of some individuals to advertising of pharmaceuticals to quit smoking. For example, smokers with less than high school education are more likely to use smoking cessation products ⁸³, probably because advertising is targeted to those individuals.

Economic theories that seek to explain the SE differences in smoking are thus mainly based on differences in education. Educated individuals produce health more efficiently, value the future more, have higher knowledge, critical thinking, and understanding about health risks, are allowed to have better jobs that are better paid, and are more prone to reach and use information and innovation. Finally, economic issues matter through income levels, which influence the purchase of tobacco products or consultations to quit smoking, and through prices, that could exclude low affluent people from the access to smoking cessation consultations or pharmaceutical products.

2.3.2 Sociological theories of smoking inequalities

Inequalities in smoking can also result from selection of friends. Individuals choose their friends based on age or SES, which makes them have similar preferences. This is known as social homophily, i.e., the clustering of individuals with the same socio-demographic, behavioural, and intra-personal characteristics ⁸⁴. Higher educated people usually seek more educated friends ⁷⁷. Consequently, peer pressure will exacerbate individuals' positive health behaviours by accumulating the effects of peers' and own education on health, which might increase inequalities. In particular, schooling may be widening the inequalities gap since there is evidence that higher SES schools, while displaying lower prevalence of adolescent smoking, might be promoting the higher social clustering of smokers ⁸⁵.

Homes can also be a place for inequalities, i.e., if adults from low SES smoke more, the level of exposure to family smoking would be higher for adolescents with a low SE background than for others from a more privileged background. This is the socially differential exposure effect ⁸⁶. Even different influences at the area-level are important in explaining inequalities in smoking status. Adolescents living in more deprived places smoke more ⁵⁹, while lower prevalence of regular smoking is observed in higher affluent areas ⁶⁰. A substantial part of the variance in cross national prevalence of regular smokers among adolescents results from differences in country structure or place of residence ⁶⁰. This was also observed among adults: people living in more deprived neighbourhoods have a greater likelihood of being smokers than those living in neighbourhoods with a lower deprivation score ⁸⁷.

Thus, the sociological influences could worsen smoking inequalities through the clustering of smokers, at neighbourhoods, school, or home.

2.3.3 Psychosocial theories of smoking inequalities

Lower income levels, poverty, and/or unemployment create stressful situations and pose more difficulties and problems to daily life, such as making ends meet. Thus, the immediate pleasure given by smoking might be a way of coping with adversity ⁷⁶. Also, lower status jobs are subject to more stress due to lower control over working life, and are associated with poorer health and more prevalence of risk behaviours ^{88,89}. Individuals from lower status jobs might believe that they cannot influence their life and health outcomes (lower coping ability), and have lower capacity to respond to new challenges ⁹⁰. This helplessness and hopelessness might make them believe that behaving in a healthy way is not going to help them to have better health and longer life. For example, people with low control might think that they cannot stop smoking, or

think that smoking will not influence health outcomes ⁹¹. The evidence confirms that fatalistic beliefs and hopelessness negatively affect health behaviours ⁹²⁻⁹⁴.

Concluding, the psychological influences could exacerbate smoking inequalities through occupational characteristics, or stressful events arising from by poverty and unemployment.

2.3.4 Biological mechanisms

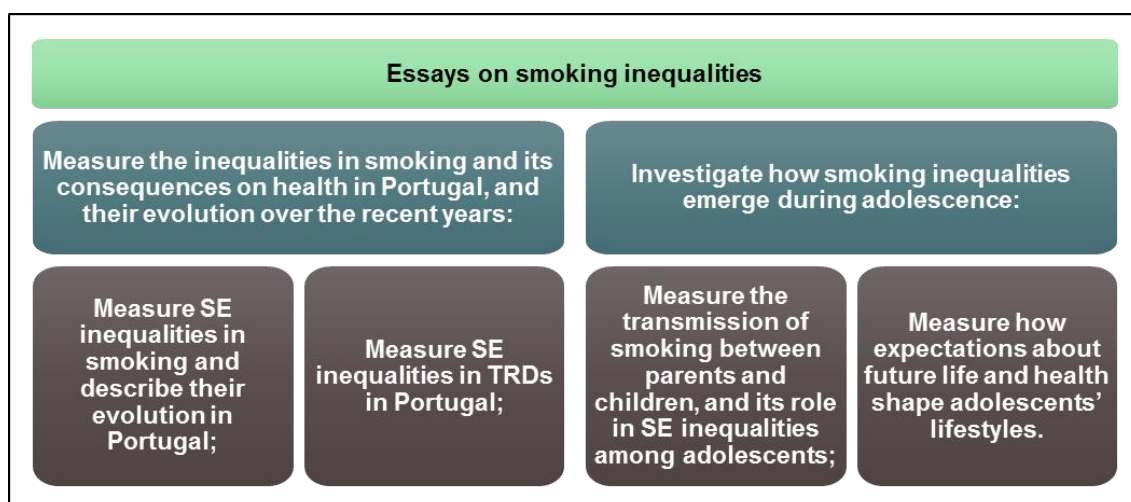
As seen above, tobacco causes psychological and physical dependence, which in turn make it difficult to stop smoking. Social factors have no influence on tolerance levels for example, but they may affect reinforcement ⁵⁴. Since socioeconomically disadvantaged persons consume more than more advantaged people ^{22,23}, they will be less likely to quit, because present consumption is dependent on past consumption levels, as observed previously in TORA model.

3 OBJECTIVES AND STRUCTURE

The tobacco is spread all over the world, but the use is concentrated in more deprived individuals. The well-known health consequences of smoking, namely morbidity and mortality, will be then disproportionately distributed across society. Several theories try to explain the SE inequalities on smoking but there is still a lot to know about the way smoking inequalities emerge. Better knowledge of inequalities, trends, and social patterns of use and initiation, are essential to create better informed policies.

This thesis has two main objectives: (i) measure the SE inequalities in smoking and its consequences on health in Portugal, and their evolution over the recent years; (ii) investigate how SE inequalities in smoking emerge during adolescence, which is the crucial period of life in terms of adoption of lifestyles. The thesis was developed along four chapters, each one corresponding to a specific objective, as described in Figure 3.

Figure 3. Primary and secondary objectives.



This thesis is structured as follows. The first two chapters indicate that SE inequalities have reversed in Portugal, and are particularly marked in the youngest cohorts. This shows that SE inequalities in smoking are a highly relevant matter of concern if one thinks of future SE inequalities in health, which already exist and are expected to rise, in the light of our findings. These results emphasize the necessity to better understand inequalities among the youngest, i.e., when unhealthy lifestyles develop and inequalities emerge. The last two chapters use data from an international survey carried out in six European cities on adolescents selected from two grades in secondary education, and focus two specific issues: the vulnerability to family smoking and the role of future expectations. We show that family smoking is strongly and consistently associated with adolescent's smoking, and that unhealthy lifestyles (not

only smoking, but also binge drinking and cannabis) are shaped by adolescents' expectations about their future. Both aspects contribute to explain the early rise of SE inequalities in smoking, first because underprivileged adolescents are more likely to be subject to tobacco use at home (even if the transmission occurs in all families), and second because future expectations are extremely marked from a social viewpoint. We detail here-below the content of these papers, highlighting their relevance and contribution.

4 DATA BASES AND ETHICS

This thesis is done in compliance with all the regulations, either regarding human rights or data protection. The work of other authors is properly acknowledged, through citation and source identification methods. There are no conflicts of interests to declare. The first manuscript used Portuguese Census and data from Portuguese inpatient discharges amongst Portuguese hospitals, and the second used data from National Health Interview Surveys (NHIS). The two remaining manuscripts were integrated in work package 5 of the project “Tackling socio-economic inequalities in smoking: learning from natural experiments by time trend analyses and cross-national comparisons” (SILNE). SILNE is a European project coordinated by the Department of Public Health of the Academic Medical Centre (University of Amsterdam), and receiving financial support from the European Commission in the scope of Seventh Framework Program (grant agreement number 278273). However, this is a research of original work developed by the author in collaboration with the project.

4.1 NHIS

There are four NHIS carried out so far in all mainland Portuguese regions (1987, 1995, 1998/99, and 2005/06)ⁱ. NHIS are cross-sectional studies based on representative samples of non-institutionalized individuals living in Portugal. Data was collected through face-to-face interview on health status and disease, socio-demographic indicators and health determinants, among others. The 2005/06 survey refers to the Portuguese resident population, since the responses can be expanded using the age and sex composition of the inhabitants. The previous surveys were based in sampling counts of representative inhabitants. The sampling is based in a probabilistic selection of the Portuguese Census records (see below). Confidentiality was assured through suppression of personal identification, thus the data is anonymised. More information about the NHIS can be found in Dias ⁹⁵, Instituto Nacional de Saúde and Instituto Nacional de Saúde Doutor Ricardo Jorge ⁹⁶.

4.2 PORTUGUESE 2011 CENSUS

Portuguese census data is a probabilistic sampling survey, covering all Portuguese territory. It is representative at national and regional level (7 regions), although it is desegregated until the lowest administrative level: *freguesia* (parish). The

ⁱ At the time the thesis was finalized the preliminary results of the 2014 NHIS were disclosure.

questionnaires were applied by the Statistics Portugal (Instituto Nacional de Estatística, INE), using two different methods: online and paper. Censuses follow international standards and recommendations, to ensure statistical harmonisation and comparability at international level. The published database is anonymised. The complete methodology can be found in INE ⁹⁷.

4.3 PORTUGUESE PATIENT DISCHARGES

Portuguese patient's discharges database is collected by the Central Administration of the Health System (Administração Central do Sistema de Saúde, ACSS). It gathers information about all in-patient cases on Portuguese public hospitals. The individual observations are coded according to International Classification Of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), grouped by All Patient Diagnosis Related Groups (AP-DRG) v21.0. The data gathers several administrative information as the number of the patient, date of birth, sex, place of residence [district, city and parish (*freguesia*)], dates of admission and discharge, among others, and also clinic information as diagnosis, and procedures. The data is coded for financial matters, namely for measuring hospital production and complexity, but it can also be used for research. For research purposes, the data is anonymized, omitting all information that could identify the patient, such as patient identification numbers.

4.4 SILNE SURVEY

SILNE was a three-year European project co-ordinated by the University of Amsterdam, Department of Public Health, Academic Medical Centre, the Netherlands. The project received financial support from the European Commission in the frame of Seventh Framework Programme (grant agreement no. 278273). The aim of the project was to use several different European contexts as 'natural experiments' within Europe in order create new empirical evidence, and suggest strategies to reduce SE inequalities in smoking.

In order to answer those questions, a survey was applied in six European cities: Namur (Belgium), Tampere (Finland), Hannover (Germany), Latina (Italy), Amersfoort (The Netherlands), and Coimbra (Portugal). Those cities were elected based on similarity of population size, income and employment rates with national averages. In each city, several schools were selected. The schools were paired according to strata (high versus low SES), in a stratified sampling procedure. The stratification was based by the type of school, in the case of Italy, Germany, and the Netherlands. In the case Belgium

and Portugal the stratification was based on the ranking given by feedback of the educational authorities,.

In each school two grades were selected, corresponding to adolescents aged between 14 and 16, since those are the ages were adolescents more frequently become weekly smokers ⁹⁸. These two grades corresponded to the last two grades of secondary education in Finland, Germany, and the Netherlands, while in Italy and Portugal corresponded to the first two grades of secondary education. All adolescents from those grades were invited to answer to the survey.

Ethical approval was obtained from the local or national ethical committees and in some countries also from the educational authorities. Each school was informed about the objective of the research, the contents of the questionnaire, the confidentiality of the answers, the voluntary nature of participation, and the nature of consent. While Italy and Germany required active parental consent, the remaining asked for passive parental consent.

To assure confidentiality, a code was assigned to each name, and the directory of codes was distributed along with the questionnaire. Only the code, and not the name, was identified in the questionnaire, except for Finland, where the researchers were not allowed to use a list of students. The questions about social ties were answered also by using the code to nominate friends and colleagues. After the survey, the codes were replaced by random codes by a Trusted Third Party from the IT Security Management of the University of Louvain. All these procedures were declared to the Belgian Privacy Commission (decision No. 1350057189088) and approved by the Ethical Committee decision No. 2012/09oct/461.

Of the 163 schools reached, 50 agreed to participate in the survey. The average participation rate was of 79.4%, corresponding to a total of 11,015 adolescents of the 13,870 registered adolescents in the grades. More information about the sampling and ethics can be found in Lorant *et al.* ⁸⁵, and the Portuguese versions of the questionnaires are presented in sections 9.2 to 9.4.

5 SOCIOECONOMIC INEQUALITIES IN SMOKING IN PORTUGAL

5.1 EVOLUTION OF SOCIOECONOMIC INEQUALITIES IN SMOKING: RESULTS FROM THE PORTUGUESE NATIONAL HEALTH INTERVIEW SURVEYS

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KEY WORDS: socioeconomic status; inequalities; smoking; Portugal.

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ABSTRACT

Background: Southern European countries were traditionally characterized by a higher prevalence of smoking among high SE groups. Though, recent studies show a reversal of inequalities in Italy and Spain, for example. We investigated whether this evolution also applied to Portugal by describing the evolution of SE inequalities in smoking between 1987 and 2006.

Methods: We used data from the four Portuguese national health interview surveys (N=120,140) carried out so far. SES was measured by the educational and income levels of respondents. SE inequalities were measured through Odds Ratios (OR), Relative Inequality Indexes (RII), and Concentration Indexes (CI) on being current, ever, and former smoker, adjusting for sex and age. Analyses were performed separately for men and women, and for different birth cohorts.

Results: Among men, smoking was initially more concentrated in high-SES individuals (RII=0.84, 95% Confidence Intervals [95%CI] 0.76-0.93, 1987) but this pattern reversed in the last survey (RII=1.49, 95%CI 1.34-1.65, 2005/6). Indeed, higher cessation rates were observed among high-SE groups among all respondents (RII=0.89, 95%CI 0.84-0.95), coupled with higher initiation rates among the worse-off in younger cohorts (RII=1.18, 95%CI 1.05-1.31, for youngest generation, 2005/6). Among women, the richer and more educated smoked more in all surveys (RII=0.21, 95%CI 0.16-0.27, 2005/6), despite being also more likely to quit (RII=0.41, 95%CI 0.30-0.55). The pattern

among women evolved towards a reduction of inequality, which however remained favourable to the worse-off.

Conclusions: Inequalities have been increasingly unfavourable to the worse-off in Portugal, although better-off women are still more likely to smoke. Worrisome inequality trends have been observed among the youngest generations, which call for the rapid implementation of equity-oriented tobacco control policies.

BACKGROUND

A large number of studies show that individuals of low SES face a higher burden of disease and mortality ^{23,99,100}. Behavioural risk factors, tobacco consumption in particular, are more prevalent among individuals from low SE positions, possibly contributing to these SE inequalities in health ^{22,23}.

A model of “tobacco epidemic”, developed by Lopez, Collishaw e Piha ²⁰, shows that, in a first stage, tobacco becomes socially accepted and a rising male prevalence is observed. In a second phase, male prevalence reaches a peak (around 50 to 80%) and prevalence among women increases rapidly. In this second phase the prevalence may be higher in individuals with higher education. As the health hazards of tobacco become known, the third phase is characterized by a decrease in prevalence among men. This decrease is mainly explained by reduced prevalence among individuals with higher education, who are, for example, more influenced by health promotion policies. Also, female prevalence reaches a peak (around 35 to 45%). In the last phase of the model, smoking prevalence decreases in both sexes. Smoking becomes more common among low-educated individuals while decreasing faster among high-educated ones, who are better equipped to get informed, understand the risks of tobacco consumption, and act accordingly. Recent evidence confirms that individuals with lower education and income smoke more cigarettes a day, experience a higher probability of smoking, and higher initiation and lower cessation rates ^{24–26}. Inequalities in tobacco consumption seem even to have been widening despite health policies including smoking bans, taxes, and advertising ¹⁰¹.

International comparisons on educational differences based on national health studies showed that in 1987, in southern countries like Portugal and Spain, higher educated women smoked more ²⁷. The same was true but to a lesser extent among men. Among younger men, Portugal was the country with the lowest educational differences in smoking, from the countries analysed. Subsequent studies for Greece, Italy and Portugal (data from 1998) however still found that women with higher education

smoked more, suggesting that Southern European countries might follow a different path of the smoking epidemics²². Smoking inequalities favouring the high-SES in the age group of 16 to 24 years old were found in all countries in 1998, except for Portuguese and Greek women²⁸.

Little evidence has been however produced so far to assess whether Portugal is moving towards the patterns observed in northern European countries. A regional cross-sectional study from 1999-2000 showed that smoking prevalence was higher among white collar women¹⁰². Although unemployed men smoked more, there were no smoking differences observed among men according to occupational class¹⁰². Studies combining different periods only estimated the prevalence for the total population, showing e.g. that smoking among men is stabilizing though still increasing among women^{14,103}.

This study documents the evolution of SE inequality in smoking behaviour in Portugal from 1987 to 2006, using education and income as SE factors. We describe how SE inequalities in prevalence and cessation evolved in time. As Italian analyses showed smoking inequalities to strongly vary according to birth cohort³⁰, we also analysed trends according to birth cohort to detect evolving patterns across generations. By doing so, we provide insights about the possible path of the smoking epidemic in Portugal. This information is in turn relevant for tailoring policies to the Portuguese context of inequalities in tobacco consumption.

METHODS

We used data from the four National Health Interview Surveys (NHIS) carried out so far in all mainland Portuguese regions (1987, 1995, 1998/99, and 2005/06). NHIS are cross-sectional studies based on representative samples of non-institutionalized population living in Portugal. Data were collected through face-to-face interviews on health status and disease, socio-demographic indicators and lifestyle, among others. The data from the NHIS are collected by the National Institute for Statistics, available on demand for research purposes, and the methods are reported elsewhere⁹⁶. In this study, all individuals aged 25 to 79 years old were included; younger people were excluded to avoid as much as possible individuals who had not completed their education. Also, older people were excluded to reduce the selective mortality bias. The final sample included 120,140 individuals.

We created three dichotomic variables for smoking: “current”, “former” and “ever” smoker. The “current smoker” variable was based on the question “do you currently smoke?” The last three surveys distinguished the answers “daily”, “occasionally” and

“non-smoker”. However, the 1987 NHIS only considered two categories, “daily” and “non-smoker”. In order to compare the four samples, the “current smoker” variable has a value one when the person answers “daily smoker” to the above-referred question, and zero otherwise. The “daily smoker” category included a large majority of smokers (89.4% of smokers smoked daily in 1995, 89.1% in 1998-1999 and 90.3% in 2005-2006), so that the loss of information was relatively minor. In regard to the “former smoker” variable, we used the question “Did you ever smoke?”. This question was asked solely to those who did not currently smoke; possible answers were “daily”, “occasionally”, or “never smoked”. The 1987 NHIS asked “Did you ever smoked regularly?”; hence, the “former smoker” variable has a value one for those who answered “yes” in 1987 and those who answered “daily” in subsequent surveys, and zero otherwise. Occasional smokers were included as never smokers. Finally, the “ever smoker” variable values one if the persons reports to be current or former smoker, and zero otherwise. Current smoking is thus given by the percentage of daily smokers in the sample, ever smoking by the percentage of ever smokers (current or former) within the respondents, and smoking cessation by the percentage of former smokers within the ever smokers.

We categorized education into five categories, on the basis of the highest completed diploma, namely no education (zero to three years of education), pre-primary education (four years of education), primary education (nine years of education), secondary education (12 years of education), and tertiary education (more than 12 years of education), as described in Table 14 (Appendix).

Income was also included as most studies recommend that other SE indicators beyond education should be used ¹⁰⁴. The individual income was calculated applying the Organisation for Economic Co-operation and Development (OECD) modified equivalence scale, giving different weights to different family members (1 to the first adult, 0.5 to the second and other family members older than 14 years old, and 0.3 to individuals less than 14 years old) ¹⁰⁵. In all surveys, the upper income category was open ended, e.g., “€2,000 and above”. To estimate the midpoint for the upper income category we followed Parker and Fenwick ¹⁰⁶ method. Authors used the pareto curve to compute the median value of the upper category (MD), because as the income increases, the number of individuals having that amount of income is usually lower. The authors recommend proceeding as follows:

$$MD = 10^{\left(\frac{0.301}{v}\right)} x_i \quad \text{Equation 1}$$

Where, x_i is the lower limit of the upper category, and v is given by:

$$v = \frac{\log(f_i + f_{i-1}) - \log(f_i)}{\log(x_i) - \log(x_{i-1})} \quad \text{Equation 2}$$

Where f_i is the frequency on the upper category, f_{i-1} is the frequency on the category preceding the upper category, and x_{i-1} is the lower limit of the category preceding the upper category.

SE inequalities in smoking were measured using relative inequality indexes (RII), concentration indexes (CI), and odds ratios (OR). The dependent variables were current smoking, smoking cessation and ever smoking. The independent variables were age and education, or age and income. Separate analyses were performed for men and women, for each survey, and for different birth cohorts.

The RII measure allows comparing different periods of time ¹⁰⁷, and expressing differences in relative terms, taking into account the population size and the relative SE position of groups in society ¹⁰⁸. The RII allows to regress the smoking status on the relative position on the social hierarchy ¹⁰⁷. To compute the RII, we estimated Equation 3 through generalized linear model with log-binomial and logarithmic link functions ¹⁰⁹, by sex and by survey:

$$SMK_j = \alpha + \beta_1 ridit_j^e + \beta_2 age_j + \varepsilon_j \quad \text{Equation 3}$$

Where $ridit_j^e$ was the *ridit score* for education levels and $ridit_j^i$ is the *ridit score* for income levels. Ridit score is the category range midpoint of a cumulated frequency of population in a given relative position on the society, ranked by SE variables.

The CI, as the RII, through ordering population according to SES, allowed focusing on the SE dimension. i.e., by comparing the cumulative proportions of the population with the cumulative proportions of smoking status ¹¹⁰. The equal distribution of smoking across the population results on a diagonal curve, or a concentration index equal to zero. The concentration of the smoking in deprived individuals results on a curve below the diagonal, or an index below zero.

CI was estimated according to the following equations ¹¹¹:

$$2\sigma_R^2 \left[\frac{SMK_j}{\overline{SMK}} \right] = \alpha + \beta R_j + \varepsilon_j \quad \text{Equation 4}$$

Where σ_R^2 represented the relative rank variance, R_j was the relative rank of person j in the society ordered by income levels, \overline{SMK} was the sample mean of smoking variables SMK_j . Since smoking status variables were binary, the CI coefficient was corrected, by

dividing it by the reciprocal of the mean of the variable ¹¹². CI had the advantage of using individual income data, instead of aggregated quintiles of income.

Logistic regressions were performed in order to estimate age-adjusted OR of smoking. The logistic models do not require the creation of scores, instead, they use SES as an explanatory variable.

$$SMK_j = \alpha + \beta_1 \sum_i SES_{ij} + \beta_2 age_j + \varepsilon_j \quad \text{Equation 5}$$

The use of several and complementary measures of inequality provided a more consistent analysis. Separate analyses were performed for men and women, for each survey, and for different birth cohorts.

RESULTS

Descriptive statistics are presented in Table 1. Approximately 53% of the respondents are women, with a mean age of 52 years old, while men have an average age of 51 years old. The percentage of individuals with no education was high in all NHIS but decreased over time (from 22.8% of men and 35.8% of women in the first survey to 11.0% and 18.3% in the last survey, respectively). A small percentage of individuals had tertiary education (8.7% men and 10.8% women in 2005/06) and secondary education (10.7% of men and 9.6% of women in 2005/06), whereas this value increased comparing with the previous surveys. The percentage of men that ever smoked was almost the same across the surveys (57.3% in 1987 to 55.8% in 2005/06) but the percentage of women that ever smoked more than doubled from 1987 (6.3%) to 2005/2006 (13.8%). Among men, the percentage of current smokers within respondents decreased (35.3% to 29.6%) while the percentage of former smokers within ever smokers increased (38.4% to 47.0%) from 1987 to 2005/06. The percentage of women smoking increased from 4.4 to 9.1% between 1987 and 2005/06. Over this 1987-2005/06 period, the percentage of women who stopped smoking within ever smokers increased too (30.2% to 34.0%).

Table 1. Demographic characteristics of NHIS respondents according to education, income, and smoking status, by sex and survey year ⁽ⁱ⁾.

	Men				Women			
	1987	1995	1998/99	2005/06	1987	1995	1998/99	2005/06
Educational level								
Tertiary education	2.9	5.2	6.1	8.7	1.8	5.6	7.2	10.8
Secondary education	12.8	6.3	8.0	10.7	10.6	5.3	6.7	9.6
Primary education	9.1	20.3	23.8	27.7	5.6	15.2	18.2	22.6
Pre-primary education	52.5	51.1	48.8	41.9	46.1	47.3	46.1	38.7
No education	22.8	17.1	13.3	11.0	35.8	26.6	21.7	18.3
Income level								
1st quintile (+)	22.1	21.2	21.7	22.1	20.9	19.5	20.5	20.4
2nd quintile	19.7	18.7	20.3	20.1	18.4	17.3	19.0	18.9
3rd quintile	19.8	20.2	19.6	19.4	19.5	20.6	19.6	19.3
4th quintile	20.6	21.5	18.6	15.8	19.6	21.9	17.3	16.4
5th quintile (-)	17.9	18.3	19.9	22.7	21.6	20.9	23.7	25.1
Smoking status								
Ever smokers	57.3	53.0	54.6	55.8	6.3	8.6	11.0	13.8
Current smokers	35.3	30.9	31.1	29.6	4.4	6.1	7.9	9.1
Former smokers	38.4	41.6	43.1	47.0	30.2	28.4	28.0	34.0
Age ⁽ⁱⁱ⁾	50.3	50.6	50.5	50.6	51.3	51.6	51.7	51.9
N	12 113	15 412	15 463	13 426	13 816	17 427	17 476	15 007
Daily smokers ⁽ⁱⁱⁱ⁾	33.6	32.7	32.0	28.7	5.1	7.6	10.1	11.2

i. Educational level, income level, and smoking status reported as percentage.

ii. Age reported as mean value for age in years.

iii. Daily smokers (%) in Portugal aged 15 years or older (OECD Health Data, 2010) ¹¹³.

Table 2. Age-adjusted inequality measures, per sex, smoking status and NHIS year.

	1987	1995	1998/99	2005/06
Current smokers - men				
RII for Education	0.84 [0.76;0.93]	0.95 [0.86;1.05]	0.96 [0.88;1.06]	1.49 [1.34;1.65]
RII for Income	0.97 [0.90;1.04]	0.87 [0.82;0.93]	0.97 [0.94;1.01]	1.15 [1.07;1.24]
CI for Income	0.10	0.09	0.07	-0.04
Current smokers - women				
RII for Education	0.01 [0.00;0.01]	0.02 [0.02;0.03]	0.07 [0.06;0.10]	0.21 [0.16;0.27]
RII for Income	0.11 [0.08;0.15]	0.24 [0.19;0.30]	0.36 [0.30;0.44]	0.51 [0.42;0.61]
CI for Income	0.54	0.38	0.32	0.19
Former smokers - men				
RII for Education	0.82 [0.75;0.90]	0.90 [0.84;0.96]	0.97 [0.91;1.03]	0.89 [0.84;0.95]
RII for Income	0.85 [0.78;0.93]	0.92 [0.87;0.98]	0.95 [0.93;0.98]	0.88 [0.83;0.92]
CI for Income	-0.05	-0.03	-0.03	0.07
Former smokers - women				
RII for Education	1.17 [0.78;1.77]	0.78 [0.51;1.17]	0.60 [0.43;0.85]	0.41 [0.30;0.55]
RII for Income	0.89 [0.63;1.27]	0.71 [0.53;0.96]	0.62 [0.48;0.82]	0.60 [0.48;0.76]
CI for Income	-0.01	0.08	0.11	0.18
Ever smokers - men				
RII for Education	0.72 [0.67;0.77]	0.73 [0.69;0.78]	0.77 [0.72;0.81]	1.04 [0.97;1.11]
RII for Income	0.92 [0.88;0.97]	0.83 [0.79;0.86]	0.93 [0.91;0.96]	0.93 [0.89;0.98]
CI for Income	0.11	0.11	0.08	0.02
Ever smokers -women				
RII for Education	0.01 [0.00;0.01]	0.02 [0.01;0.02]	0.05 [0.04;0.06]	0.11 [0.09;0.13]
RII for Income	0.10 [0.07;0.13]	0.20 [0.16;0.24]	0.28 [0.24;0.33]	0.36 [0.31;0.41]
CI for Income	0.56	0.42	0.36	0.27

Legend: 95% confidence intervals in parenthesis.

Among men, no significant differences between educational categories in prevalence were observed in the first three surveys (Table 2). However significant differences were observed between 1987 and 2005/06 NHIS, where in 1987 NHIS inequalities favoured the less educated (RII=0.84) and in 2005/06 NHIS the inequalities favoured the more educated (RII=1.49). In 1987 and 1998/99 surveys, the inequalities in smoking according to income were not significant. Both RII and CI for income in 2005/06 indicated that smoking is more concentrated among the poorest (RII=1.15 and CI=-0.04), contrary to the previous surveys. This reversal in inequalities was not observed

in women. Women with lower education were less likely to smoke across all surveys (e.g. RII=0.21 in the last survey). Also, women with lower income were less likely to smoke in all surveys. Income inequalities decreased slightly across surveys, but remained concentrated among the highest-income women (RII=0.51 in 2005/06 and CI=0.19).

Smoking cessation was at all periods less likely among men without education than among those with tertiary and secondary education (e.g. RII=0.89, in 2005-2006). Similarly, men with lower income were also less likely to stop smoking in all surveys (in 2005/06 RII=0.88 and CI=0.07). Among women there were only significant inequalities in cessation by education level in the last survey. In 2005/06 NHIS, RII was 0.41 for education and 0.60 for income, implying that women with lower education and income quit less.

Regarding ever smoking among men, RII for education was not significant in the 2005/06 survey. In the previous surveys, ever smoking was concentrated in highest levels of education (RII between 0.72 and 0.77). This reversal was not observed for income, as RII was very close to one (RII between 0.92 and 0.93) for all surveys. Ever smoking was also more concentrated in women with higher education and more income in all surveys. However, in the last survey, the magnitude of inequalities for education decreased (RII increased from 0.05 in 1998/99 to 0.11 in 2005/06).

Inequalities in smoking changed mostly in the 1960-69 cohort compared to the previous generations (Figure 4 to Figure 6). Education-related inequalities in the last survey for the 1960-1969 generation favoured high-educated men. 1940-1949 and 1950-1959 generations experienced inequalities favouring lower-educated men, except during the 2005/06 survey, when no significant inequalities were observed. Finally, men born in the 1920-1939 period did not experience significant inequalities across education levels in any of the observed years. Across all generations, prevalence was concentrated in women with higher levels of education. However, in the youngest generation the inequalities were less noticeable than in the previous ones. No significant education-related inequalities in cessation were observed by generational cohort, among either men or women. For youngest men generations there were no significant inequalities in ever smoking. In all other generations inequalities favoured the higher-educated men. Women with more education had a higher percentage of ever smokers. Again, the dimension of inequalities was smaller for the youngest cohort.

Figure 4. Education-related relative inequality index for current smokers by sex, birth cohort and NHIS year.

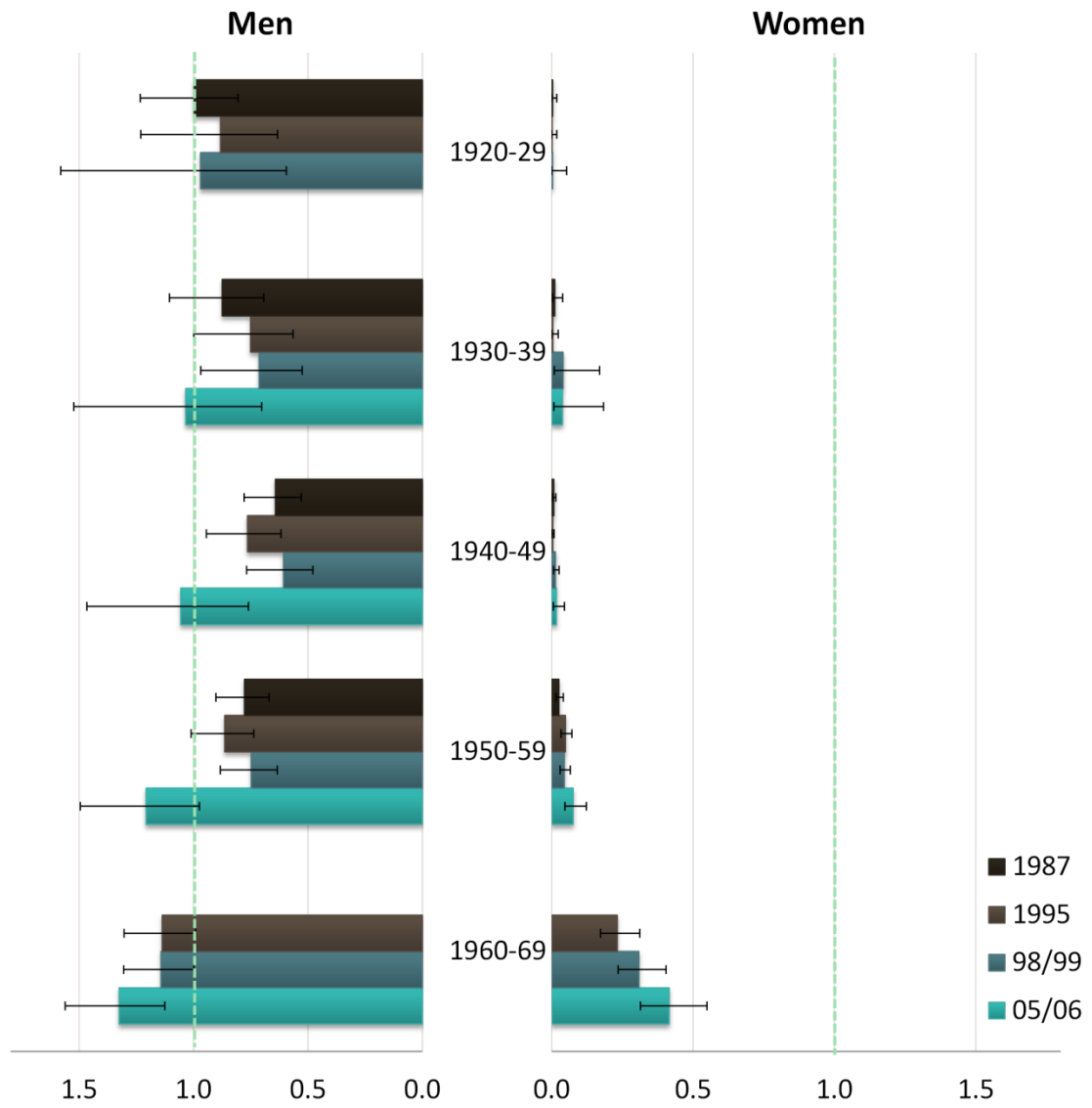


Figure 5. Education-related relative inequality index for former smokers by sex, birth cohort and NHIS year.

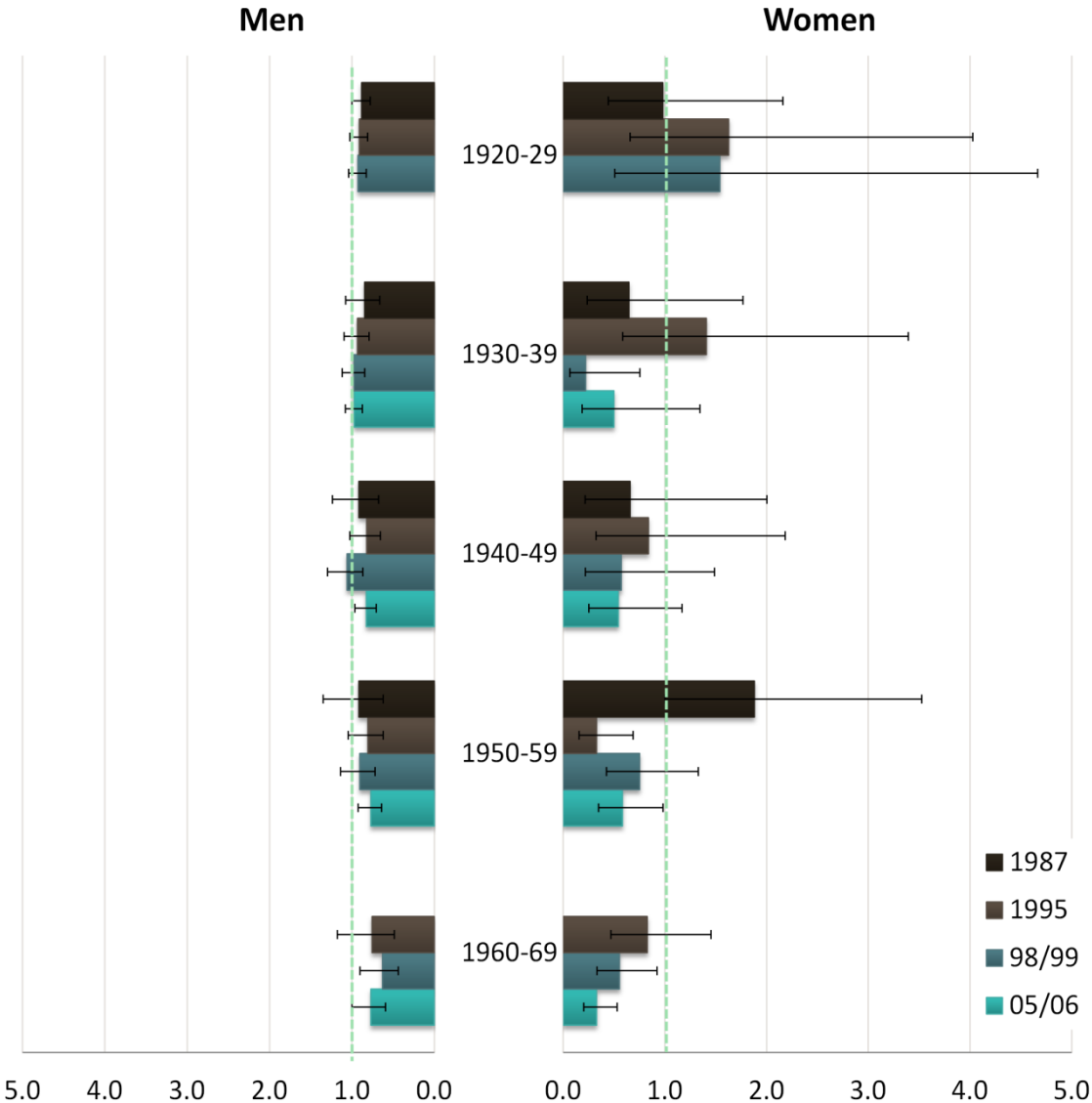
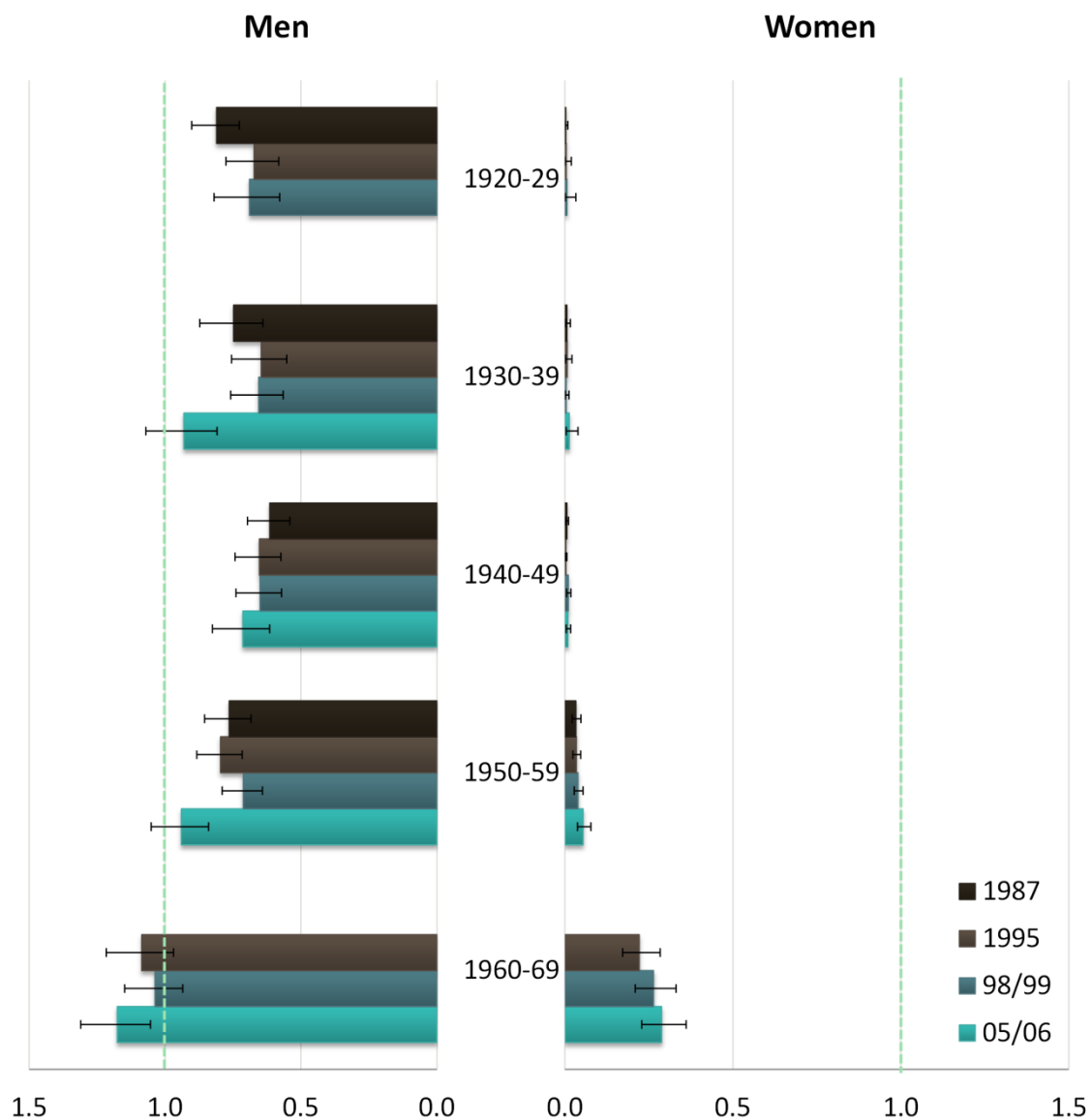


Figure 6. Education-related relative inequality index for ever smokers, by sex, birth cohort and NHIS year.



For the sake of brevity, we only describe the results for RII and CI. Table 15 to Table 17 in appendix show the results for OR analyses, that confirmed the ones found for RII and CI.

DISCUSSION

To the best of our knowledge, this is the first study carried out in Portugal regarding the evolution of smoking inequalities. Findings show that over the 1987-2006 period inequalities in smoking behaviour reversed for men, related to higher cessation rates among high SE groups in all surveys analysed coupled with higher initiation rates

among low SE groups in the first three surveys, particularly in younger cohorts (1960-1969). A similar trend for current smoking was observed among women but not enough to observe that reversal in the social gradient. This could be explained by higher initiation rates among high SE groups in all surveys, and the emergence of inequalities in cessation favouring the richer in the last survey, especially in the youngest cohort.

Results confirm that Portugal belongs to the group of Southern countries where women lag behind men in the smoking epidemics ^{20,22}. However, unlike Italy and Spain, the reversal in inequalities has not been observed yet among younger women ^{29,114}. For example, in Italy, low educated men aged 25 to 49 years old were more likely to smoke (OR=1.26), while for women in the same age group inequalities reversed ²⁹. This suggests either it is too early to observe a reversal, or Portugal experiences a different path.

This last interpretation is consistent with Thun, Peto, Boreham, and Lopez ²¹. These authors suggest an update of the epidemiological model of smoking, based on the observation that paths among women significantly vary across countries. For example, in Spain, the late attenuation of smoking cultural prohibition to women delayed women smoking-related mortality and most likely reduced the maximum prevalence levels that would be attained, when compared with countries such as the United States or the United Kingdom ²¹. Similarly, a study from Bosdriesz, Mehmedovic, Witvliet, and Kunst ¹¹⁵ found higher prevalence of women smoking in high SE groups in Latin America and Eastern Mediterranean countries. Authors justify this pattern with the later emancipation of women and with the proximity to Southern European countries, where there is a higher acceptability of smoking among women, coupled with a conservative environment in low SE and rural groups ¹¹⁵.

Portugal might experience a similar trend with prevalence among women growing late, and with persisting higher prevalence among richer and higher-educated persons. Further study of the most recent trends in countries such as Portugal may show in more detail alternative paths of inequalities in the smoking epidemic.

Although national health surveys are widely used because they provide large sample sizes and important information on health, they suffer from well-known limitations ⁹⁵. Firstly, smoking status and cessation were self-reported. However, the validity of self-reports of smoking was showed in most studies ¹¹⁶. Authors usually recommend validation of smoking status (e.g. by biochemical tests) only in intervention studies, and self-administered questionnaires ¹¹⁶. Also, the validity of the self-reported smoking status has proved to be high in population-based studies ¹¹⁷. Self-reported smoking

could be a more serious limitation to this study if under-reporting was related to SES. For example, in lower SE classes, characterized by traditional and conservative environments, the acceptability of smoking among women could be lower. If this is the case, our results may over-estimate the pro-rich SE inequalities in smoking among women.

Secondly, the last survey was from 8 years ago and the inequalities have probably changed by now. In particular, important tobacco policies have been implemented since then, like the protection against involuntary tobacco exposure, implemented by the 2007 legislation. Further study may be relevant to provide evidence on the impact of recent tobacco control policies on inequalities, for which no consistent evidence has been produced yet ¹¹⁸.

CONCLUSIONS

Our results demonstrate an increase of inequalities in cessation, and a reversal of inequalities on smoking among men; thus we may predict a growth of inequalities in health against the worse-off in the future. The trends observed in women also predict the emergence of such inequalities on a near future.

The literature points that tobacco policies have different effects on individuals according to SES; for example price increases seem more effective among poorer individuals or those employed in manual occupations, thus reducing inequalities ⁴⁰. Our results show a potential widening of inequalities in younger generations; this worrisome trend suggests prioritizing equity-oriented tobacco control strategies such as price increases.

5.2 SOCIOECONOMIC INEQUALITIES IN TOBACCO-RELATED DISEASES IN PORTUGAL: AN ECOLOGICAL APPROACH

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KEYWORDS: Inequality; socioeconomic status; tobacco-related diseases.

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ABSTRACT

Objectives: The existence of socioeconomic (SE) inequalities in smoking is well demonstrated, but less is known about its consequences. This study measures SE inequalities in the prevalence of tobacco-related diseases (TRDs) in Portugal, using a new area-based SE indicator.

Study design: Ecological study.

Methods: In-patient data were used to identify TRDs discharges at all Portuguese NHS hospitals for the year 2011. The definition of TRDs incorporates malignant cancers, cardiovascular diseases, cerebrovascular diseases and respiratory diseases. We created an area-based SE indicator on the basis of census data, using factor analyses. The association between the prevalence of TRDs and the SE indicators was measured using Generalized Linear Models. The spatial correlation of this indicator was assessed using variograms.

Results: Two area-based SE factors were identified at the parish level, reflecting (i) social position (education and occupation); and (ii) deprivation (overcrowding and manual occupations). Upper-social-class areas were associated with a lower prevalence of malignant cancers, cardiovascular, and respiratory diseases.

Conclusion: We found significant inequalities in TRDs across Portuguese parishes using a newly created area-based SE indicator reflecting several SE dimensions. This result emphasizes that inequalities in smoking are reflected in inequalities in health, and should be tackled through equality-oriented area-based tobacco policies.

INTRODUCTION

The literature shows that 22% of male all-cause deaths and 6% of female all-cause deaths are due to TRDs²³. Also, the likelihood of survival is greater among never smokers than among ever smokers¹¹⁹. In Portugal, 11.7% of deaths and 11.2% of disability adjusted life years are attributable to smoking, with a very uneven distribution across genders, probably due to the different patterning of risk behaviours^{4,9}.

Meanwhile, there is much evidence that tobacco is socially patterned²², related to the unequal access to information, to the unequal ability to process information and adapt behaviours, or to the unequal access to smoking cessation programmes⁴³. If the worse-off are more likely to smoke, they are potentially more at risk of developing TRDs, and die earlier. From a theoretical viewpoint, Adler and Stewart posit that unhealthy lifestyles are a major mediating factor between SE conditions and health outcomes¹²⁰. Using an indirect approach, Jha et al. establish this link between SE inequalities in smoking and the SE patterning of mortality¹²¹. In Portugal, however, the SE inequalities in smoking have emerged very recently, and, to our best knowledge, there is no evidence on the SE inequalities in tobacco-related morbidity^{4,28}. This paper measures the SE inequalities in the prevalence of TRDs in Portugal using a newly created SE area-based indicator for the lowest administrative level in Portugal (parishes/freguesias).

Area-based SE indicators are widely used in health since they capture several dimensions of SES. Some well-known examples are the Townsend Index, Jarman Index, and Carstairs Index, based on census indicators^{122–124}. Area-based SE indicators influence health outcomes such as mortality and cancer incidence, pre-term birth and low birth weight, cardiovascular disease incidence, and several causes of death including heart disease, malignant neoplasms, and others^{125–128}. From a theoretical viewpoint, SE area-based indicators are proxies for individual SES. For example, Krieger *et al.*¹²⁵ concluded that single and composite area SE variables (at census tract and block group levels) provided similar information regarding mortality and cancer incidences. In the absence of individual data on SES, area-based SE indicators are useful substitutes to the usual markers of SE conditions such as education and income, whose causal effects on health have been well established¹²⁹. Area-based SE indicators also proxy the neighbourhood conditions where people live, and the relation of these conditions with health has also been well demonstrated¹³⁰.

METHODS

CREATING AN SE INDICATOR FOR PORTUGUESE PARISHES

Census data from Statistics Portugal (2011) was used to compose an SE indicator ¹³¹. Data refer to 4,050 mainland *Parishes* (with an average of 2,480 inhabitants) and include the following SE factors: education (percentage of people older than 15 with no education, secondary education, and higher education), income (percentage of houses with monthly costs with acquisition higher than €500, percentage of people more than 15 years old living with guaranteed minimum income), occupation (percentage of unemployed people more than 15 years old, percentage of residents employed in intellectual, scientific, and technical occupations, industry, trade, and services occupations, industrial and manual occupations, and primary sector occupations), housing conditions (percentage of buildings more than 50 years old, percentage of buildings damaged and with great repairing needs, percentage of households with parking or garage, and percentage of overcrowded houses), and family environment (percentage of people more than 65 years old living alone).

The choice of the SE variables was guided by theoretical insights from the literature and by the availability of information. From a theoretical viewpoint, education, income, and occupation have been regarded as major influences on health conditions because they refer to “what resources individuals hold and what sort of life chances they have” (Lynch and Kaplan, page 19) ¹²⁹. According to Glymour *et al.* ¹³², “socioeconomic status is typically characterized along three dimensions: education, employment, and money” (p.17). Education is related to future success (and thus access to economic resources and prestige), and to capacity to learning and gathering information. Occupation signals the working environment (and thus exposure to risks, including psychosocial ones), and also the income and prestige. Finally, income relates directly to the material conditions (housing, food, medical care, neighbourhood, etc.). In order to complete the relatively limited information on material resources, we added variables related to housing, which is a marker of wealth and living conditions. Also, according to the model of SE inequalities proposed by Adler and Stewart, the living conditions mediate the relationship between the SE primary indicators (education, income, and occupation) and the health outcomes ¹²⁰. The family environment also completes the picture of resources and constraints, as the family potentially provides social and material support that are beneficial for health (see also Adler and Stewart ¹²⁰).

We used factor analysis to explore the relation between variables from the 2011 Portuguese Census. Our analysis explores the correlation of a given set of variables in

order to find a small number of underlying variables named principal component. The aim is to capture the shared relationships, structure, and highest percentage of the total variance of the original variables, and get other variables not as correlated with each other as the original ones ^{133,134}. We selected the number of components whose eigenvalue is higher than one. We then repeated factor analysis in two sub-samples selected randomly from the general sample. These analyses were performed using SPSS, version 20.

USING THE INDICATOR TO CHARACTERIZE SE INEQUALITIES IN THE PREVALENCE OF TRDs

To measure the association with TRDs, we used data for all in-patient discharges at Portuguese NHS hospitals for the year 2011 (Portugal. Ministério da Saúde. ACSS). Data on in-patient stays included 576,687 fully-comparable observations, with information on primary diagnosis, secondary diagnosis, interventions, length of stay, age, gender, and area of residence (parish). The main TRDs were selected according to Borges and Gouveia ⁹, and are listed in Table 3.

Table 3. ICD-9-CM from tobacco related diseases

Malignant Cancers

- 140-149 - Lips, oral cavity, pharynx
- 150 - Esophagus
- 151 - Stomach
- 157 - Pancreas
- 161 - Larynx
- 162 - Trachea, lungs, bronchi
- 180 - Cervical
- 189.1 - Kidney
- 188 - Bladder

Cardiovascular disease

- 410-414 - Ischemic cardiac disease (adults 35-64 and ≥65 years old)
- 412-414 - Other cardiac diseases
- 440 - Atherosclerosis

Cerebrovascular disease

- 433-434 - Adults 35-64 years old
- 436-438 - Adults ≥65 years old

Respiratory diseases

- 480-487 - Pneumonia, flu
 - 490-492 - Bronchitis, emphysema
-

Source: Borges and Gouveia, 2009 ⁹.

AN ADDITIONAL CHARACTERIZATION OF THE SE INDICATOR: SPATIAL APPROACH

Using census tract zip code boundaries as a proxy for neighbourhoods may include heterogeneous populations which do not correspond to the actual context where people live. People are not confined to physical boundaries, but move across space limits and are subject to multiple “extra-neighbour” environments, when going to work or school, for example. Also, an area might suffer from positive or negative externalities from neighbouring areas, for example, from river pollution, or dangerous buildings in the neighbourhood. It is thus of primary importance to characterize if “spatial continuity” exists, to evaluate if the phenomenon under analysis is local, regional, or national level. There are several methods to characterize the spatial continuity of a variable. We used the so-called variogram $\gamma(h)$, which is a graphic representation of the spatial continuity of a variable as a function of distance and direction ^{135,136}. The spatial analysis was conducted in GeoMS, and the maps were constructed with Quantum GIS Development Team software ¹³⁸, using shapefiles from official administrative map of Portugal (CAOP, 2011) ¹³⁹.

RESULTS

CREATING AN SE INDICATOR FOR PORTUGUESE PARISHES

Descriptive statistics for education, occupation, housing conditions, wealth, and family composition are presented in Table 4. The sample comprised 4,050 observations, corresponding to the Portuguese parishes. Many variables had a correlation greater than 0.3, the Kaiser-Meyer-Olkin measure of sampling adequacy was above 0.5, and the probability associated with Bartlett’s test of sphericity was lower than the significance level ¹³³. Thus, the data complied with the statistical assumptions required for the factor analysis procedure. From the factor analysis, we obtained two non-rotated factors, which explained 75.01% of total variance. The communalities explained more than half of each original variable's variance.

Table 4. Descriptive statistics of the sample (N=4050)

Variable	Mean	Std. Deviation
Education (†)		
People older than 15 years old without schooling (%)	10.1	5.9
Population older than 15 years old with secondary education (%)	14.8	5.1
Population older than 15 years old with higher education (%)	10.3	7.4
Occupation (†)		
Residents employed in intellectual, scientific and technical occupations (%)	3.6	3.0
Residents employed in industry, trade and services occupations (%)	18.8	6.5
Residents employed in industrial and manual occupations (%)	12.8	6.5
Residents employed in primary sector occupations (%)	3.5	4.0
Residents unemployed with more than 15 years old (%)	12.5	5.3
Housing conditions (†)		
Buildings constructed before 1961 (%)	27.1	16.0
Buildings with great repairing needs or much deteriorated (%)	5.1	5.2
Households with parking or garage (%)	58.1	18.4
Dwellings (classic families) of usual residence overcrowded (%)	9.1	4.5
Wealth (†)		
Dwellings with monthly costs of acquisition equal or greater than €500 (%)	17.5	14.5
Residents with >15 years old and living mainly from guaranteed minimum income (%)	0.9	1.1
Owner occupied houses (%)	19.4	12.2
Family composition (†)		
Individuals with ≥65 years old living alone as a percentage of total individuals (%)	5.7	3.5
Prevalence of inpatient cases with tobacco-related diseases (‡)		
Malignant cancers (‰)	1.4	3.8
Cardiovascular disease (‰)	0.9	2.2
Cerebrovascular disease (‰)	0.2	0.6
Respiratory disease (‰)	2.4	5.2

Source: (†) Instituto Nacional de Estatística (2011) ¹³¹ and (‡) Portugal. Ministério da Saúde (2011) ¹³⁷.

Secondary education, occupations related with industry, trade and services, and owner-occupied houses contributed positively to the first component (see Table 5). Low education contributed negatively to this first component. We called this first component

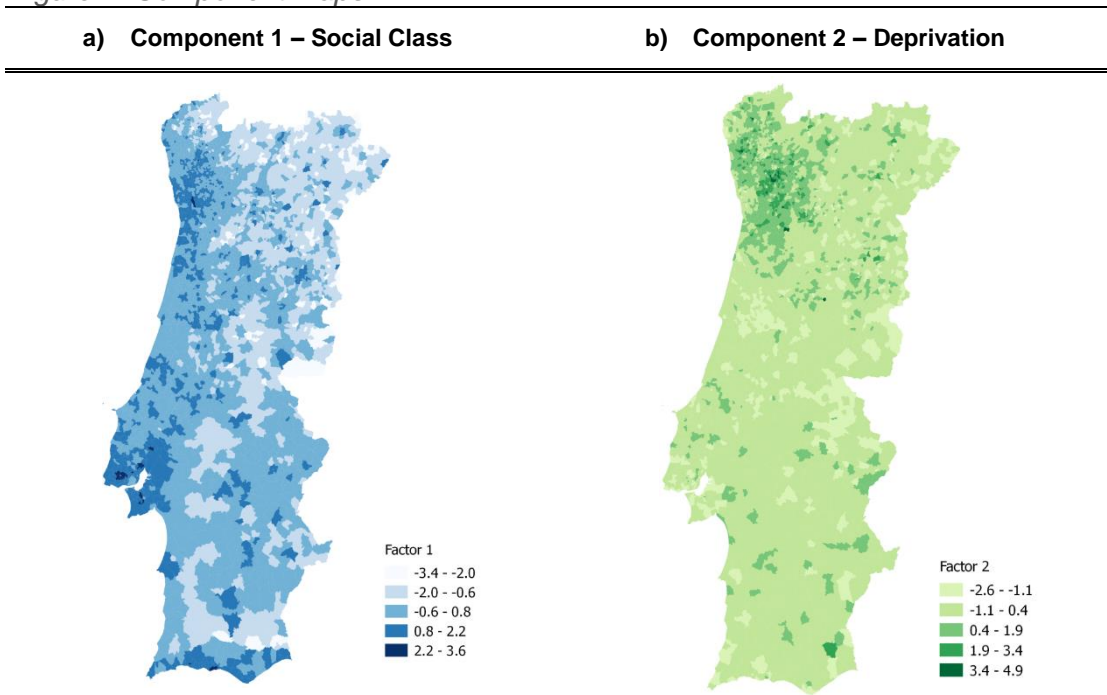
“social position”. The second component was positively correlated with manual occupations and overcrowded houses, so that we called it “deprivation”.

Table 5. Results from principal component analysis

Components	1 st factor	2 nd factor	Communalities
People older than 15 years old without schooling	-0.81	-0.05	0.66
Population older than 15 years old with secondary education	0.91	-0.24	0.88
Residents employed in industry, trade and services occup.	0.87	-0.31	0.86
Residents employed in industrial and manual occupations	0.40	0.74	0.71
Dwellings (classic families) of usual residence overcrowded	0.33	0.70	0.60
Owner occupied houses	0.89	-0.09	0.79
<i>Eigenvalue</i>	3.30	1.20	
<i>Cumulative percentage of variance explained</i>	54.97	75.01	

Note: Values with factor weights higher than 0.4 are displayed in bold.

Figure 7. Component maps



Note: Categories of indicators were based in quintiles.

From the first map in Figure 7 we see that the highest values for social position (factor 1) were located mainly in North coastal regions, in the Lisbon metropolitan area, and in Algarve. For factor 2, most shaded areas were in the Porto metropolitan area and the Alentejo region close to the Spanish border. Finally, the analysis performed in the randomly selected sub-samples gave similar results in terms of number of components and contents, and dimensions of communalities.

USING THE INDICATOR TO CHARACTERIZE SE INEQUALITIES IN THE PREVALENCE OF TRDS

The results from regression analysis in Table 6. More privileged parishes experienced a lower prevalence rate of in-patient stays for three of the TRDs according to the first component (model 1), namely for malignant cancers ($\beta=-0.27$, $p<0.001$), cardiovascular disease ($\beta=-0.18$, $p<0.001$), and respiratory diseases ($\beta=-0.34$, $p<0.001$). When we adjusted for the percentage of inhabitants older than 65 (model 2) the relation remained significant for malignant cancers ($\beta=-0.32$, $p<0.001$) and respiratory diseases ($\beta=-0.44$, $p<0.001$), it became significant for cerebrovascular diseases ($\beta=-0.25$, $p<0.01$), and lost significance for cardiovascular diseases. By contrast, the association was never significant for the second component when adjusting for the percentage of inhabitants older than 65.

Table 6. Regression analysis (robust) for the prevalence of inpatient stays from tobacco-related diseases.

	Malignant cancers		Cardiovascular disease		Cerebrovascular disease		Respiratory disease	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Intercept	-7.12 ^{***}	-6.99 ^{***}	-7.71 ^{***}	-8.14 ^{***}	-9.08 ^{***}	-8.53 ^{***}	-6.52 ^{***}	-6.26 ^{***}
Social position	-0.27 ^{***}	-0.32 ^{***}	-0.18 ^{***}	-0.03	-0.05	-0.25 [*]	-0.34 ^{***}	-0.44 ^{***}
Deprivation	0.06	0.04	-0.07 ^{**}	-0.01	0.15 ^{***}	0.08	-0.01	-0.05
Pop >65		-0.51		1.62 [*]		-2.09 [*]		-0.97 [*]
Adj. R ²	0.14	0.12	-0.01	0.12	0.03	-0.02	0.06	0.26

Significance levels: * $p<0.05$, ** $p<0.01$, *** $p<0.001$;

(1) Model only with the component factors;

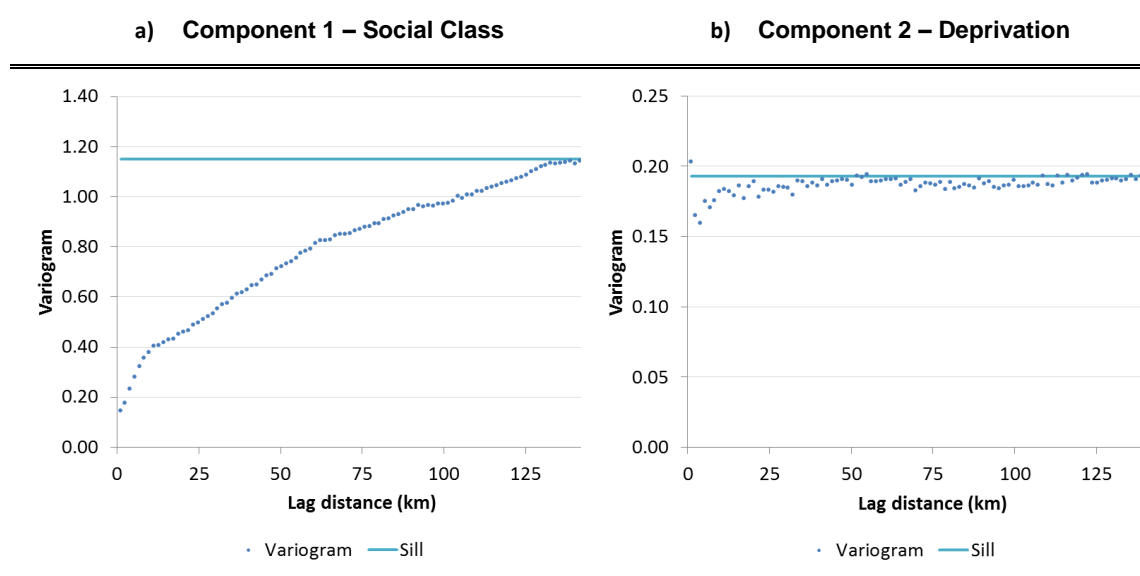
(2) Model adjusted also for the percentage of inhabitants with more than 65 years old;

Adj. R² = Squared correlation between the observed and the predicted values.

AN ADDITIONAL CHARACTERIZATION OF THE SE INDICATOR: SPATIAL APPROACH

The variograms are shown in Figure 8. The component of social position (Figure 8a) showed a spatial continuity, with 88% of the data following a geographical structure, and the spatial relationship being observed until a range of 145km. The deprivation component had a non-negligible percentage of unexplained variance (83%) with a range of 52km, which indicated that many of the data variation was not explained by a spatial continuity (Figure 8b). The spatial continuity (for the first component) and negligible spatial continuity (for the second component) demonstrate that SE factors continue to follow a geographical pattern. Thus, the local influence using parish boundaries can be considered as appropriate.

Figure 8. Omnidirectional variograms for components



DISCUSSION

This study sought to measure the SE inequalities in the prevalence of TRDs in Portugal using a new SES characterization of Portuguese parishes. We first created SES indicator comprising two components that gathered information on the SE position and deprivation. This indicator was very complete and comprehensive as it embraced and organized different components (education, occupation, income, housing, family context).

Associations between area-based SE indicators and TRDs were explored using an exhaustive database of in-patient stays. Lower prevalence rates of tobacco-related in-patient stays were associated with more privileged areas. These results confirmed the ones found in literature, which show that mortality from TRDs are more prevalent among the worse-off ²³. Also using area-based variables, a recent study associated poverty rate of the residential census tract with cancer linked to risk factors (as tobacco, alcohol, drug use, sexually transmitted disease, and poor diet) ¹⁴⁰. Two mechanisms may underlie these findings. On the one hand, there is substantial evidence that smoking is more prevalent among the worse-off, related to the insufficient information or its inadequate use, to the greater financial barriers to stop smoking, and to a greater exposure to tobacco in social networks ⁴³. The reversal of inequalities in Portugal, with greater prevalence of tobacco consumption among the poor and less educated men, appears to be reflected in the inequalities of TRDs ⁴. On the other hand, it may well be that among smokers, the better-off are less vulnerable to TRDs, for example because their lifestyle is healthier despite their smoking habits, or because they have better access to and use of medical services. By contrast, the

deprivation indicator was not significantly associated to TRDs. One possible explanation is that the living environment, which is a major contributor to this indicator, may be associated with health conditions unrelated to tobacco, as asbestos related cancers ¹⁴¹ .

Some limitations have to be taken into consideration. Firstly, several authors argue that composite indicators are difficult to interpret and do not permit comparisons with other studies. However, our results showed two distinct and informative factors, related with social position and deprivation, which allowed for relatively straightforward interpretations ¹³⁰. In this sense, we considered that the two components extracted from the factor analysis could be used for different purposes in public health, as tools to identify SE inequalities in health and healthcare needs. Secondly, this study did not include in-patient data from private hospitals. However, according to national statistics, in 2012 80.5% of in-patient cases were in hospitals overseen by state government ¹⁴². Thirdly, information about other SE components such as social capital and support, income inequality, and ethnicity, were not available at the lower administrative level, used in this study. Finally, although it is useful to analyse contextual factors in order to explain health, we should not infer individual- from aggregate-level relationships, otherwise we are incurring the risk of the so-called ecological fallacy, i.e., applying conclusions from aggregates and ignoring individuality ¹⁴³.

In conclusion, we found significant inequalities in TRDs across Portuguese parishes, with lower prevalence rates of in-patient stays being associated with more privileged areas. In other terms, our paper shows that the inequalities in smoking are reflected in inequalities in TRDs, with potentially detrimental consequences on inequalities in health and mortality. On the one hand, these results reinforce the need for policies that reduce the inequalities in smoking, such as tobacco taxation or pricing ⁴⁰. On the other hand, the newly created SE indicator for Portuguese parishes underscores that inequalities were observable on a geographical basis, suggesting that the reduction of SE inequalities in tobacco could be achieved by targeting the less privileged areas.

6 SOCIOECONOMIC INEQUALITIES IN SMOKING IN ADOLESCENTS – SILNE SURVEY

6.1 ADOLESCENT SMOKING AND ITS SOCIAL PATTERNING IN SIX EUROPEAN CITIES: THE ROLE OF PARENTAL SMOKING

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KEYWORDS: adolescent; adolescent behaviour; smoking; inequality; socioeconomic; family

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ABSTRACT

Background: Several studies observed SE inequalities in smoking among adolescents. However, the causes are not fully understood. This study investigates the association between parental and adolescent smoking, and whether this association is socially patterned, contributing to the SE inequalities in smoking.

Methods: We used data from SILNE, a survey administered to students of six European cities (N=10,794). Using logistic regressions, we modelled the probability of being smoker as a function of parental smoking and SES. We tested whether the smoking association differed across social strata.

Results: Low SES adolescents were more exposed to smoking parents. Boys and girls were more likely to smoke when father (OR boys=1.85, 95%CI=1.44-2.37; OR girls=1.41, 95%CI=1.09-1.82) and mother smoked (OR boys= 1.76, 95%CI=1.36-2.28; OR girls=3.20, 95%CI=2.48-4.14). Among boys, the odds of smoking when having a smoking parent were higher in lower SE classes. However, this was not statistically significant, nor was it observed among girls.

Conclusion: Adolescents are more likely to smoke when their father and mother smoke. SE differences in parental smoking contribute to the transmission of SE inequalities in smoking. Though, the susceptibility to parental smoking was similar across social classes, not confirming the greater vulnerability among the worse-off.

INTRODUCTION

There is a large body of evidence of SE inequalities in smoking in adolescence. Most studies found that smoking is more prevalent among adolescents from low SE groups¹⁴⁴. The SES is associated with smoking initiation in young people and a greater likelihood of adolescents to become daily smokers¹⁴⁵. Additionally, a recent study has shown that the SE inequalities in smoking among adolescents have been rising¹⁴⁶. Adolescent smoking is a matter of concern because smoking behaviour that starts in adolescence usually persists thereafter, contributing to endless intergenerational cycles of nicotine dependence, TRDs, and premature mortality¹⁴⁷. Despite this consistent evidence, there is no convincing explanation of why inequalities in smoking emerge at an early age. Among the possible causes, parental modelling and attitudes appear in the first place. A major risk of adolescents' smoking initiation is the imitation of their parents' smoking behaviour and that exposure to parental smoking is associated with adolescent smoking and heavy smoking in early adulthood^{26,63,147,148}. This relation remains even when controlling for peer influences⁶⁴. Besides, having both parents smoking more than doubles the risk of smoking^{149–152}. This risk is smaller when parents are former smokers or declining smokers; and the earlier the parents quit smoking, the lower the risk of adolescent's smoking^{150,152,153}. Several reasons why smoking is transmitted across generations were identified in the literature: (i) contradicting messages (smoking parents simultaneously saying that smoking is dangerous to health), (ii) parents easing adolescent's access to tobacco products, and (iii) imitation of parents smoking behaviours, by role modelling^{147,153,154}. Additionally, shared genetic traits may include addiction profiles, and nicotine or drug responses^{72,73}.

It is however not known how much parental smoking contributes to the SE inequalities in adolescent smoking. On the one hand, the parent-child transmission is expected to contribute to inequalities simply because the adolescents from lower social classes are more exposed to parental smoking. On the other hand, if parents from low SES are more prone to influence their children's smoking habits, the contribution of parent-child transmission to inequalities might be larger than expected, since adolescents from low SE background would be more susceptible to parents' smoking habits. A greater vulnerability among the worse-off may occur for at least three reasons: (i) they may

receive less information from parental and non-parental sources; (ii) low-educated parents may impose less restrictive norms on their children's tobacco use, and adopt less restrictive norms in regard to their own smoking behaviour, for example smoking in front of their children; (iii) they may play a less central role in friendship ties, having a lower freedom of choice among friends, and a greater vulnerability to influences. This study aims at testing if the association between parent and child smoking varies by SES.

METHODS

DATA

We used data from the SILNE survey, a self-administered questionnaire applied in 2013 to students of adolescents aged 14-16, from two grades of 50 secondary schools from six European cities Namur (Belgium), Tampere (Finland), Hannover (Germany), Latina (Italy), Amersfoort (Netherlands), and Coimbra (Portugal), N= 11,015. The survey was applied between January and November 2013, and had a participation rate of 79.4%. In each country, ethical approval from local or national authorities was requested and obtained. Detailed methods and ethical information can be found in Lorant et al ⁸⁵. Questionnaires with a high number of missing variables, i.e., more than 20 missing answers, were dropped, so that the final sample included 10,794 observations.

VARIABLES

Measures for smoking

The main variable of interest was daily smoking, which was measured as smoking at least one cigarette a day in the last 30 days¹⁵⁵. Parental smoking status was assessed by the question "Does any member of your household smoke cigarettes?". We created two binary variables for parental smoking status, namely for maternal smoking and paternal smoking (yes=1, no=0).

Further analyses were performed using alternative smoking measures (see below). Experimental smoking was defined as trying cigarette smoking, having smoked only one cigarette, not having smoked or smoked 1 to 2 cigarettes in the last 30 days or having smoked only a few times (yes=1, no=0) ¹⁵⁵. Smoking in the last 30 days is a variable that equals one when adolescent smoked at least one cigarette in the last 30 days, and zero otherwise. Smoking at least weekly was defined as smoking at least one cigarette per week, in the last 30 days (yes=1, no=0). Nicotine dependence was a continuous variable based on Stanford Dependence Index ¹⁵⁶. This variable is created

as the sum of scores (0 to 5) of the questions: “when you are in a place where smoking is not allowed, is it difficult for you not to smoke?”, “do you smoke more in the morning than during the rest of the day?”, “do you smoke even when you are really sick?”, “how deeply do you inhale the smoke?”, and “how soon after waking up in the morning do you smoke your first cigarette?”.

Measures for the socioeconomic status

Educational level of parents was assessed by the questions “what is the highest level of schooling your father /mother attended?”. As the education levels differed across countries, we created three categories: high, medium, and low. Note that a category “other school leaving certificate” was only available for Germany but included a very small number of cases so that it was not used in the analysis (N = 12 for father and N = 16 for mother).

The Subjective Social Position (SSP) corresponded to the 10-category answers to the question “Imagine that this ladder pictures how country society is made up. Fill in the circle that best represents where your family would be on this ladder.” This variable was recoded in country specific tertiles, given the low number of cases in some categories.

The Family Affluence Scale (FAS) is a widely used instrument to measure SE background ¹⁵⁷. It gathers information about four different questions: “does your family own a car, van or truck?”, “do you have your own bedroom?”, “how many computers/laptops/ tablets does your family own?”, and “during the past 12 months, how many times did you travel away on holiday with your family?”. The sum of these items was categorized into country specific tertiles.

Other covariates

The variable “living without father” was dichotomous with a value 1 if the adolescent lived with her mother and not with her father, and zero otherwise. The variable “living without mother” was constructed similarly. We also considered the exposure to peer smoking, measured by the number of friends that smoke among the up-to-five best friends nominated by the respondent. Then, the variable was transformed into a binary response that equalled one if the adolescent had more than one best friend that smoked and zero otherwise. We finally included a variable for academic achievement, computed as the country specific tertiles from the question “which of the following best describes your marks during the past year?”.

ANALYSIS

We used logistic regressions to model the probability (Odds Ratio, OR) of the adolescent to be a daily smoker as a function of parental smoking (maternal and paternal smoking), SES (SSP, FAS, parental education, and academic achievement), and family and social context (live without mother, live without father, friends' smoking), adjusting for the age and for the country, and stratified by sex. This was the base model.

The effect of SES on the association between parents and child smoking was tested by studying the interactions between parental smoking status and the SES variables. The interactions were introduced separately into the base model. Additionally, we performed a stratified analysis for the different SE groups.

Sensitivity analysis

We replicated the base model and interactions for different measures of smoking: experimental smoking, smoking in the last 30 days, smoking at least weekly, and nicotine dependence. The latter was modelled with ordinary least squares, since it is a continuous variable, while the others were modelled with logistic regressions.

RESULTS

Descriptive statistics are presented on Table 7. Most of the students were aged 15 to 17 years old; 14% of the girls and 16% of the boys smoked daily; 30% of the students reported that his/her father smoked, and more than 20% of students reported that their mother was a smoker.

Table 7. Descriptive statistics of the sample (SILNE, 2013).

Variables	Girls		Boys	
	N	(%)	N	(%)
Total sample	5,604	(52)	5,146	(47)
Age				
Less than 15 years old	1,480	(26)	1,211	(24)
Age 15 to 17	4,007	(72)	3,757	(73)
Age 18 to 19	108	(2)	159	(3)
Smoking				
Daily smoker	763	(14)	804	(16)
Parental smoking				
Paternal smoking	1,474	(30)	1,365	(30)
Maternal smoking	1,214	(24)	1,078	(23)

Variables	Girls		Boys	
	N	(%)	N	(%)
Family and peer context				
Live without father	1,266	(23)	1,009	(20)
Live without mother	196	(4)	210	(4)
Friends smoke	2,112	(38)	2,038	(40)
City				
Coimbra (PT)	932	(17)	941	(18)
Amersfoort (NL)	956	(17)	935	(18)
Latina (IT)	1,229	(22)	833	(16)
Hannover (DE)	710	(13)	700	(14)
Tampere (FI)	739	(13)	744	(14)
Namur (BE)	1,038	(19)	993	(19)
Academic achievement				
Low	3,010	(55)	3,272	(65)
Medium	1,519	(28)	1,088	(22)
High	993	(18)	645	(13)
Subjective social position (SSP)				
Low	2,501	(46)	2,129	(42)
Medium	1,883	(34)	1,800	(36)
High	1,091	(20)	1,091	(22)
Family affluence Scale (FAS)				
Low	2,924	(52)	2,591	(50)
Medium	1,695	(30)	1,596	(31)
High	985	(18)	959	(19)
Parental Education				
Father - low	3,372	(26)	3,125	(26)
Father - medium	1,774	(39)	1,615	(38)
Father - high	1,598	(35)	1,510	(36)
Mother - low	1,041	(22)	865	(20)
Mother - medium	1,981	(41)	1,818	(43)
Mother – high	1,782	(37)	1,576	(37)

Figure 9 shows that the exposure to smoking is greater among the adolescents from lower SE groups; in other terms, if parents and children's smoking behaviours are associated, the SE inequalities in smoking will naturally reproduce across generations.

Figure 9. Prevalence of paternal and maternal smoking according to socioeconomic variable (SILNE, 2013).

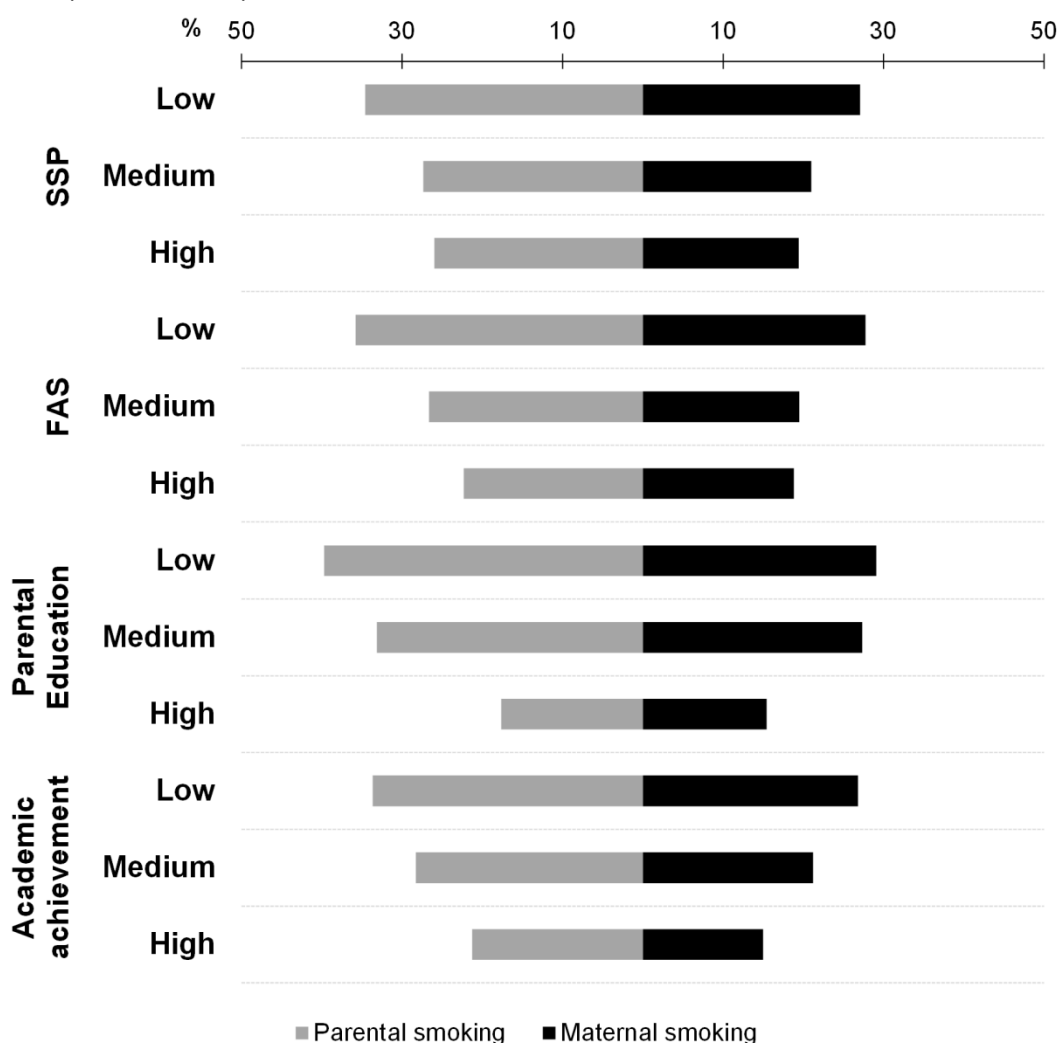


Table 8 summarises the results of the multivariate analyses. Among boys, the likelihood of smoking was associated to exposure to paternal smoking (OR=1.85, 95%CI=1.44-2.37), as well as maternal smoking (OR=1.76, 95%CI=1.36-2.28). As for girls, the likelihood of smoking was also higher when exposed to a smoking father (OR=1.41, 95%CI=1.09-1.82) and even greater when exposed to a smoking mother (OR=3.20, 95%CI=2.48-4.14). Boys and girls having more than one smoking best friend were more likely to smoke (OR boys =3.99, 95%CI=3.16-5.04; OR girls =4.92, 95%CI=3.81-6.36). Among the SE variables, only the academic achievement had a significant association with smoking; lower grades increased the risk of smoking (OR boys=2.98, 95%CI=1.76-5.04; OR girls=8.90, 95%CI=4.44-17.84, for worst academic achievement compared to best).

Table 8. Multivariate logistics regression for the association between daily smoking and socioeconomic variables, stratified by sex.

Daily smoking	Boys OR [95%CI]		Girls OR [95%CI]	
Age				
Less than 15 years old (reference)	1.00		1.00	
15 to 17 years old	2.49	[1.74;3.57]	2.19	[1.55;3.11]
18 to 19 years old	5.39	[2.90;10.01]	5.37	[2.56;11.27]
Parental smoking				
Paternal smoking	1.85	[1.44;2.37]	1.41	[1.09;1.82]
Maternal smoking	1.76	[1.36;2.28]	3.20	[2.48;4.14]
Family and peer context				
Live without father	1.69	[1.27;2.24]	1.32	[0.98;1.77]
Live without mother	1.72	[1.00;2.97]	1.92	[1.07;3.45]
Friends smoke	3.99	[3.16;5.04]	4.92	[3.81;6.36]
City				
Coimbra (PT)	0.90	[0.65;1.27]	0.63	[0.43;0.92]
Amersfoort (NL)	0.76	[0.51;1.13]	0.56	[0.34;0.93]
Latina (IT)	1.29	[0.93;1.77]	1.45	[1.04;2.03]
Hannover (DE)	0.57	[0.34;0.96]	0.76	[0.44;1.31]
Tampere (FI)	0.66	[0.43;1.01]	1.25	[0.76;2.06]
Namur (BE; reference)	1.00		1.00	
Academic achievement				
Low	2.98	[1.76;5.04]	8.90	[4.44;17.84]
Medium	1.46	[0.83;2.58]	4.18	[2.03;8.63]
High; reference	1.00		1.00	
Subjective social position (SSP)				
Low	0.91	[0.67;1.25]	1.22	[0.87;1.71]
Medium	0.83	[0.62;1.12]	1.06	[0.76;1.49]
High; reference	1.00		1.00	
Family affluence Scale (FAS)				
Low	0.81	[0.59;1.10]	0.79	[0.56;1.13]
Medium	0.84	[0.61;1.15]	0.94	[0.66;1.33]
High; reference	1.00		1.00	
Parental Education				
Father - low	0.88	[0.62;1.25]	1.14	[0.77;1.67]

Father - medium	0.77	[0.57;1.05]	0.95	[0.67;1.34]
Father – high; reference	1.00		1.00	
Mother - low	1.12	[0.77;1.62]	1.04	[0.70;1.54]
Mother - medium	1.43	[1.07;1.91]	1.10	[0.80;1.53]
Mother – high; reference	1.00		1.00	

The results for the logistic regressions with interactions between paternal smoking and SE variables are presented in Table 9. For boys, most of the odds of smoking when having a smoking parent were higher in lower SE classes, but did not reach statistical significance. For girls, the interactions were not significant either. For girls, the ORs for most interactions were below one in lower SE categories, meaning that the association between parental smoking and adolescent smoking was weaker in low SES adolescents.

Figure 10 presents the ORs for daily smoking stratified by SE variables, for boys and girls respectively. In all strata, the likelihood of smoking was higher when the father and mother were smokers. The stratified analysis confirmed the absence of noteworthy differences between SE strata in the likelihood of smoking daily when parents smoke, for either boys or girls. In line with the interaction analyses, the 95% confidence intervals for estimates for different SE strata were overlapping with each other.

Results for other measures are presented in the Table 10. Smoking experimentation was not related with parental smoking. Contrarily, the other three measures, smoking in the last 30 days, smoking at least weekly and nicotine dependence, were related with parental smoking. None of the interactions of parental smoking with SE variables were significant for smoking experimentation, smoking in the last 30 days, and smoking at least weekly. For nicotine dependence, the interactions were similarly not significant among girls, and were only significant for one out of three SE variables for boys. To summarize, the interactions were only significant in two out of 48 comparisons, confirming previous results.

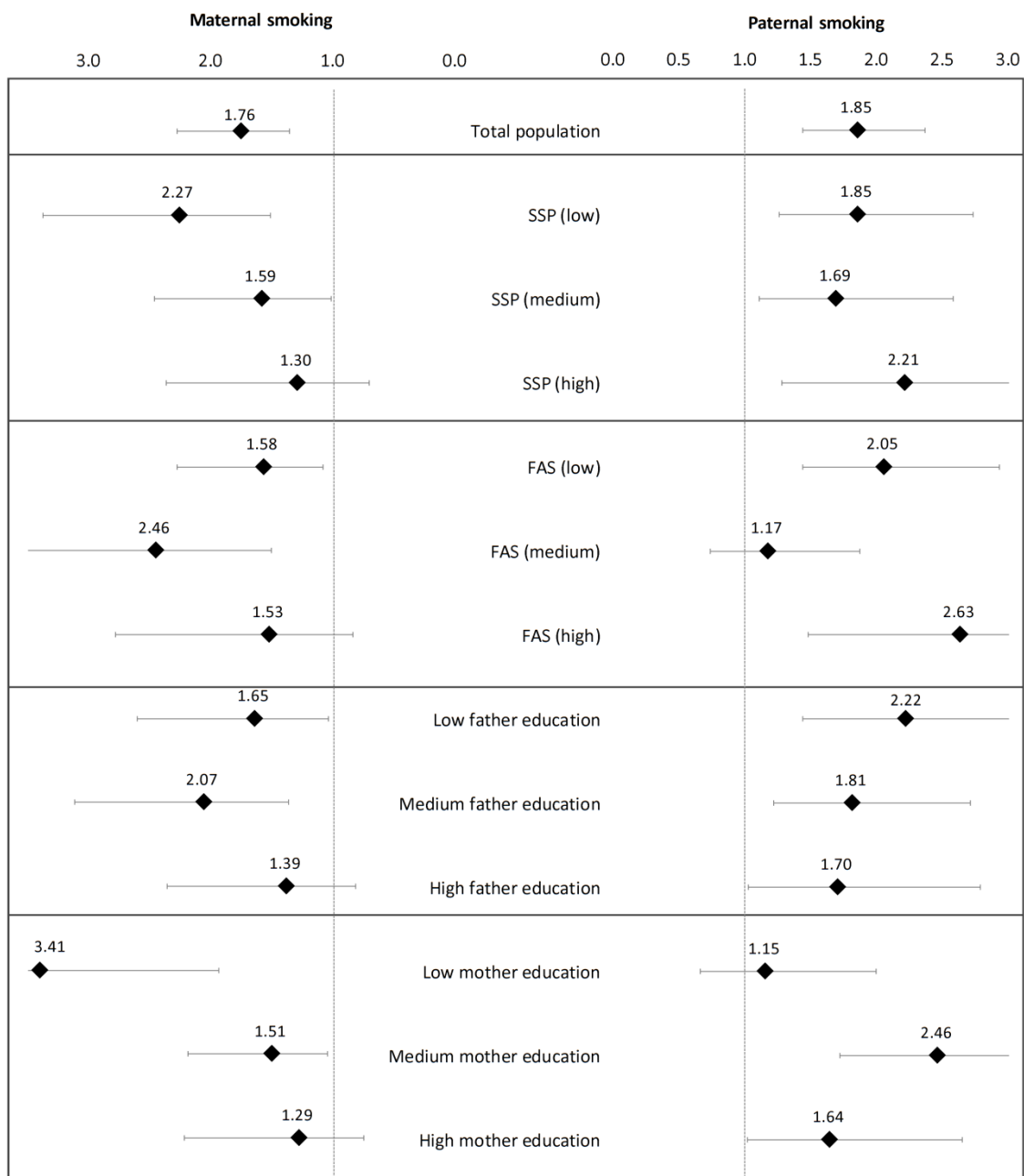
Table 9. Multivariate logistic regressions for daily smoking, including interactions between parental smoking and socioeconomic variablesⁱ.

	Paternal smoking OR [95%CI]			Maternal smoking OR [95%CI]		
	SES = SSP	SES = FAS	SES = Paternal education	SES = SSP	SES = FAS	SES = Maternal education
BOYS						
Main effects						
Parental smoking						
Paternal smoking	1.84 [1.12;3.01]	2.53 [1.48;4.33]	1.59 [1.00;2.53]	1.87 [1.45;2.39]	1.85 [1.45;2.38]	1.85 [1.44;2.37]
Maternal smoking	1.77 [1.36;2.29]	1.75 [1.35;2.27]	1.76 [1.36;2.28]	1.26 [0.74;2.13]	1.55 [0.89;2.68]	1.30 [0.80;2.14]
SES						
Low	0.86 [0.58;1.27]	0.86 [0.59;1.26]	0.82 [0.54;1.25]	0.76 [0.53;1.09]	0.79 [0.55;1.14]	0.92 [0.60;1.42]
Medium	0.88 [0.61;1.27]	1.02 [0.70;1.50]	0.73 [0.51;1.04]	0.79 [0.56;1.12]	0.77 [0.53;1.11]	1.33 [0.96;1.85]
High (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Parental smoking * SES interaction						
Low	1.14 [0.63;2.05]	0.78 [0.42;1.44]	1.23 [0.67;2.25]	1.83 [0.98;3.42]	1.08 [0.57;2.02]	1.88 [0.94;3.77]
Medium	0.87 [0.47;1.59]	0.55 [0.28;1.07]	1.22 [0.69;2.17]	1.22 [0.64;2.34]	1.38 [0.68;2.77]	1.35 [0.75;2.43]
High (reference)	1.00	1.00	1.00	1.00	1.00	1.00
GIRLS						
Main effects						
Parental smoking						
Paternal smoking	1.75 [1.00;3.06]	1.58 [0.87;2.85]	1.65 [0.94;2.88]	1.41 [1.09;1.82]	1.40 [1.09;1.81]	1.41 [1.09;1.82]
Maternal smoking	3.19 [2.47;4.13]	3.21 [2.48;4.15]	3.20 [2.48;4.14]	3.33 [1.92;5.78]	3.15 [1.77;5.60]	4.45 [2.72;7.29]
SES						
Low	1.35 [0.89;2.07]	0.83 [0.54;1.26]	1.19 [0.76;1.87]	1.27 [0.83;1.93]	0.83 [0.55;1.27]	1.20 [0.75;1.92]
Medium	1.15 [0.75;1.77]	0.98 [0.64;1.49]	1.01 [0.68;1.52]	1.05 [0.69;1.60]	0.85 [0.55;1.30]	1.30 [0.88;1.92]
High (reference)	1.00	1.00	1.00	1.00	1.00	1.00
Parental smoking * SES interaction						
Low	0.75 [0.40;1.44]	0.88 [0.45;1.72]	0.85 [0.43;1.67]	0.90 [0.48;1.71]	0.89 [0.46;1.72]	0.68 [0.35;1.32]
Medium	0.79 [0.40;1.57]	0.87 [0.42;1.81]	0.80 [0.42;1.56]	1.04 [0.52;2.06]	1.32 [0.64;2.72]	0.63 [0.35;1.15]
High (reference)	1.00	1.00	1.00	1.00	1.00	1.00

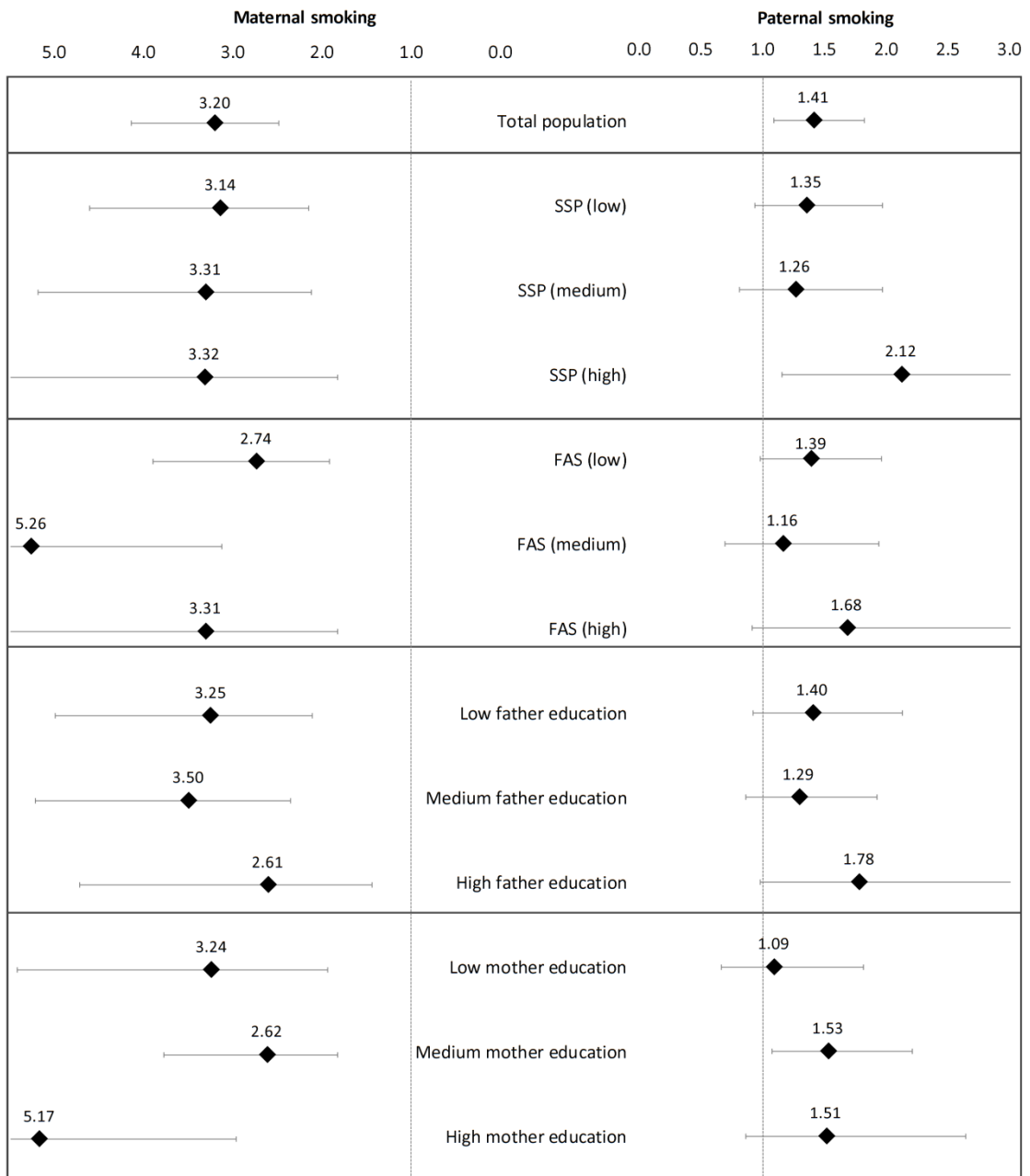
Note: ⁱ all regressions included as confounder the age, family context, peers' smoking behaviour, city, and academic achievement. The odds ratios for these variables were not included to ease the reading.

Figure 10. Association between daily smoking and parental smoking (OR and 95%CI), stratified by socioeconomic variables (SILNE, 2013).

BOYS



GIRLS



Legend: Dashed line represents OR =1.

Table 10. Coefficients for paternal and maternal smoking for other smoking measuresⁱ [95% confidence intervals].

	Paternal smoking	Interactions of paternal smoking with SES	Maternal smoking	Interactions of maternal smoking with SES
Boys				
Smoking experimentation ⁱⁱ	1.27 [0.70;2.31]	NO	0.85 [0.59;1.21]	NO
Smoked - last 30 days ⁱⁱ	2.20 [1.35;3.58]	NO	1.31 [1.01;1.71]	NO
Smoked at least weekly ⁱⁱ	2.18 [1.31;3.62]	NO	1.64 [1.24;2.15]	NO
Nicotine dependence ⁱⁱⁱ	1.75 [0.45;3.06]	YES (FAS)	1.38 [0.65;2.12]	YES (SSP)
Girls				
Smoking experimentation ⁱⁱ	1.21 [0.66;2.20]	NO	0.93 [0.69;1.25]	NO
Smoked - last 30 days ⁱⁱ	1.64 [0.99;2.70]	NO	2.77 [2.16;3.55]	NO
Smoked at least weekly ⁱⁱ	1.52 [0.88;2.62]	NO	3.35 [2.58;4.36]	NO
Nicotine dependence ⁱⁱⁱ	0.92 [-0.42;2.26]	NO	2.23 [1.60;2.86]	NO

Note:

ⁱ Adjusting for all other variables, as in Table 8.

ⁱⁱ Odds Ratio.

ⁱⁱⁱ β coefficient.

NO means that the interaction is not significant at a 5% threshold;

YES means that the interaction is significant at a 5% threshold

DISCUSSION

MAIN FINDING OF THIS STUDY

This study confirmed that adolescents are more likely to smoke when their father and mother smoke. Because the exposure to parental smoking is greater among the worse-off, the association between parents' and children's smoking behaviour contribute to SE inequalities in adolescent smoking: parental smoking render SE inequalities sticky across generations. The association between parental smoking and adolescent smoking was about similar between SE groups.

Empirical results did not confirm our initial intuition of a greater sensibility to parental smoking among the worse-off. We had suggested that this greater vulnerability might be related to a lower access to information, in particular from the parents, less restrictive norms at home, and more permeability to influences at school. Our findings possibly indicate that the role model is the most important factor of the parent-children smoking association, regardless of the norms or the information that the parents may transmit to their children about smoking. This interpretation is supported by a study

demonstrating that the crucial issue is the parents' behaviours in front of their children, and not what they may tell or impose to them ¹⁵⁸.

WHAT IS ALREADY KNOWN ON THIS TOPIC

Our study showed an increased likelihood of adolescent daily smoking when parents smoke. This consistent relation implies that the smoking behaviour is transmitted across generations, confirming previous studies, some of which with longitudinal designs ^{26,63,64,147–153,159}. The association with maternal smoking was stronger for girls, while the association with paternal smoking was greater for boys. This finding is consistent with that of other studies, and it could reflect an effect of susceptibility to role models presented by same-sex parents ¹⁵⁴. This stronger relation between daughter and mother could also be a result of specific messages or social pressures transmitted between female family members regarding traditional norms/roles played in the society ¹⁶⁰.

WHAT THIS STUDY ADDS

This study provided new evidence about the effect of parental smoking on adolescents' smoking behaviours. Our results did not confirm that the worse-off adolescents might be more susceptible to parental exposure to smoking. Consequently, non-parental influences – related to peers and schools – are indispensable to fully understand SE inequalities and their recent growth. However, there is a remarkably constant influence of parental exposure across social classes. The strong association between parental and adolescent smoking behaviour was observed across different analyses, controlling for different variables, and among different SE groups. The social differences in parental smoking contribute to the intergenerational transmission of SE inequalities in smoking. This result emphasizes that policies aimed to prevent adolescent smoking may start in parental smoking. By focusing parents, policies have thus the potential to not only decrease adolescents' smoking but also its social patterning. Some interventions addressing youth smoking through parents already proved to be effective. An intervention in the US, for example, combined a children-targeted risk-reduction program with an intervention aimed at improving the parents' monitoring and communication skills about risk behaviours ¹⁶¹. Similar experiences have been successfully developed for preventing alcohol consumption or high-risk sexual behaviours among adolescents ^{162–164}.

LIMITATIONS OF THIS STUDY

This study may suffer from some limitations. First, self-reports of adolescent smoking status were not validated by biochemical measures. However, some authors show that

the accuracy of self-reported smoking is satisfactory in school based questionnaires and in self-administered questionnaires ¹⁶⁵. Accuracy is also higher when respondents are assured, as in our case, of the privacy and confidentiality ^{85,165}. A second limitation is related with parental smoking being reported by the students. However, young adult reports of parental smoking are highly reliable ¹⁶⁶. Also, this study is a cross-sectional analysis, so that we cannot make inferences about causality and transmission of behaviours. Nonetheless, there is little doubt regarding the direction of causality, i.e., parents' behaviours are antecedents of children's attitudes. Finally, we have no information of parents that stopped smoking. However, the 15-18 years old age group is critical for smoking decision ¹⁶⁷. Thus the exposure to parent smoking may be more relevant now than in the past.

6.2 DO FUTURE EXPECTATIONS ABOUT THEIR FUTURE SHAPE

ADOLESCENTS' RISK BEHAVIOURS? AN INSTRUMENTAL VARIABLE

APPROACH

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KEYWORDS: risk behaviour, expectations, inequality, adolescents

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ABSTRACT

Background: Adolescence is a transition period where youths adopt lifestyles that may prolong over life, with consequences for their future health. Future expectations shape investments in healthy behaviours, and are a major regulator of attitudes. We test the hypothesis that the adoption of risk behaviours is associated with adolescents' future prospects.

Methods: We used data from the SILNE survey (2013) applied to students from six European cities (N=11,015). We modelled separately the probability of smoking, nicotine dependence, binge drinking, use of cannabis/marijuana, and having multiple risk behaviours, as a function of future expectations about life and health, controlling for several confounders, using probit models. Then, to address reverse causation, we replicated the analysis using a bivariate probit model with the percentage of classmates with poor expectations as instrumental variable.

Results: Poor expectations significantly increased the likelihood of smoking daily by 16 percentage points (pp), of nicotine dependence by 10 pp, of binge drinking by 14 pp, of using cannabis/marijuana by 12 pp, and of multiple risk behaviours by 10 pp. After accounting for reverse causation, the influence of poor expectations on daily smoking

increased to 32 pp, on nicotine dependence to 26 pp, and on multiple risk behaviours to 20 pp.

Conclusions: Risky health behaviours are more likely with poor future expectations among adolescents. Programs that encourage positive and realistic future expectations should be implemented in schools' health programmes.

BACKGROUND

Among the many theories that aim at explaining risk behaviours, economists have long studied time-related effects, examining the role of expectations and time preferencesⁱⁱ. In particular, the model of health capital views healthy lifestyles as an investment that increases the stock of health over the whole lifecycle, allowing for a longer and healthy life⁴⁵. By contrast, unhealthy behaviours can be interpreted as under-investments in health^{45,46}. However, investing in health through healthy lifestyles is costly because it is time consuming (withdrawn from labour and leisure) and because it is expensive (think of the prices of healthy diet or gym clubs). According to the economic theory, people decide to adopt unhealthy behaviours when marginal returns on investments equal the opportunity cost of the unhealthy behaviour. Crucially, since most of the health benefits arising from current investments are obtained in the future, they depend on people's time preferences and expectations. Less patient people attribute a lower weight to later periods' utility, leading them forego long-term health benefits in exchange of higher current pleasure. People with poor expectations for the future – because, e.g., of a poor clinical history or unfavourable clinical family antecedents – will also tend to favour the short term.

Psychosocial theories also highlight the role of future expectations, which highly influence goal setting and planning, and regulate attitudes and emotional well-being⁶⁷. Psychosocial theories of planned behaviour¹⁶⁸, in particular, view behaviours as immediately driven by intentions, which result themselves from behavioural beliefs (i.e., resulting from expected consequences of behaviours), normative beliefs (i.e., resulting from external pressures), and control beliefs (i.e., resulting from self-efficacy and locus of control). The expectations are central in this formulation because they are a major component of control beliefs, and thus a crucial determinant of intentions and behaviours. These psychosocial theories are of relevance in our case because they focus the adolescence as a crucial period of life for the definition of later outcomes and

ⁱⁱ Time preference refers to the extent to which individuals are willing to exchange utility in the present for utility in the future (for an exhaustive review on time-related effects, see Cawley and Ruhm⁴⁶).

life chances ¹⁶⁹. Expectations are fundamental during this period of development transition because it is when persons plan their future and define themselves ⁶⁸.

The role of time preferences is controversial in the empirical economic literature ^{43,170,171}. By contrast, the role of expectations has received more empirical validation. Expectations about an early death predicted the legal and illegal substance use among adolescents, exceeding the daily limits of moderate drinking, and smoking more than a pack a day ⁶⁹. The perceptions about life expectancy were related with other risk taking behaviours, such as risky sexual behaviour, weapon use, and selling drugs ¹⁷². The adolescents' perceptions about future certainty, such as dying early or contracting HIV or AIDS, explained higher delinquency among African American adolescents ¹⁷³. In a sample of economically disadvantaged, predominantly minority, urban adolescents, those who had low perceived chances of success in life had a higher probability of initiation and escalation of binge drinking ¹⁷⁴. Adolescents with higher perceived expectations to live into the middle age smoked less in young adulthood, and adolescents with higher perceived chances of attending college exercised more and smoked less cigarettes ¹⁷⁵. More generally, evidence shows that adolescents really make their decisions (for example about future college and work outcomes) taking in consideration their expectations, and update them according to new information that becomes available ¹⁷⁶.

Although the findings are relatively consistent across studies, we may point two limitations in the previous literature. First, the previous studies focused one or two risk behaviours, related to specific groups or populations, and second they did not account for the potential reverse causation. Indeed, future expectations might influence the adoption of risky lifestyles, which in turn increase the pessimism about the future life because adolescents know the consequences of risk behaviours. For example, the literature indicates that binge drinkers have worse perceived life chances ^{52,170,174}.

This study aims at examining how various risk behaviours (daily smoking, binge drinking, and cannabis/marijuana use), and severity of risk behaviours (nicotine dependence, and multiple risk behaviours) are related to future expectations about longevity and health, using micro data for adolescents from six European cities. We hypothesize that poor future health expectations are associated with a higher likelihood of behaving risky. Our study contrasts with previous ones for three reasons. First, by focusing several dimensions of lifestyle, we check the consistency of the influence of future expectations across behaviours, which allows a better testing of the theories exposed here-above. Second, for the same reason, our cross-country sample allows

examine whether results are consistent across different contexts. Third, we use an instrumental variable approach to address the issue of reverse causation.

METHODS

DATA

The SILNE survey (*Tackling socio-economic inequalities in smoking: learning from natural experiments by time trend analyses and cross-national comparisons*) is a self-administered questionnaire applied between January and November 2013 to students from two grades in secondary education, from 50 schools of six European cities (Namur/ Belgium, Tampere/ Finland, Hannover/ Germany, Latina/ Italy, Amersfoort/ Netherlands, and Coimbra/ Portugal). The participation rate of this survey was 79%. SILNE's methods are described elsewhere ⁸⁵. The final sample included 10,794 observations.

DEPENDENT VARIABLES

The analysis was performed on three risk behaviours: daily smoking, binge drinking, and cannabis/marijuana consumption. We also tested for severity of risk behaving through nicotine dependence, and having multiple risk behaviours. Daily smoking was equal to one when adolescent smoked at least one cigarette a day in the last 30 days, and zero otherwise ¹⁵⁵.

The variable for binge drinking was based on the question "In the last 12 months, how often did you have 5 or more alcoholic drinks on one occasion?". The possible answers were "I did not have 5 or more drinks on one occasion in the last 12 months", "less than once a month", "once a month", "2 or 3 times a month", "once a week", and "twice or more a week". We created a binary variable that equalled one if the adolescent had ever had a drink of alcohol and had 5 or more drinks in one occasion in the last 12 months, and zero if otherwise.

The variable for cannabis/marijuana use was created from the question "Thinking back over the last 12 months, how often did you use marijuana or cannabis?". The options were "I have never used marijuana", "I have used marijuana but not in the last 12 months", "less than once a month", "once a month", "2 or 3 times a month", "once a week", and "twice or more times a week". The variable equalled one if the adolescent had ever used marijuana or cannabis, either in the last 12 months or not, and zero otherwise.

Nicotine dependence was a continuous variable based on Stanford Dependence Index (SDI) ¹⁵⁶. This variable was created as the sum of scores (0 to 5) attributed to each one

of five questions about smoking, namely “when you are in a place where smoking is forbidden, is it difficult for you not to smoke?”, “do you smoke more in the morning than during the rest of the day?”, “do you smoke even when you are really sick?”, “how deeply do you inhale the smoke?”, and “how soon after waking up in the morning do you smoke your first cigarette?”. The moderate to severe nicotine dependence variable was a dichotomous variable with a value one if the SDI was lower than 15, and zero if the SDI was equal or higher than 15.

The variable for multiple risk behaviours received score one if adolescents had 3 to 4 risk behaviours, among daily smoking, nicotine dependence, binge drinking, and cannabis/marijuana use, and zero if they had less than three risk behaviours.

EXPLANATORY VARIABLES

Future expectations were considered poor if the adolescent answered “I do not believe this at all” or “I do not believe this” to one of the following statements: “when I am an adult I will have a good health” and “when I am an adult I will have a long life”. The questions on health expectations were an adjusted response scale from McWhirter and McWhirter ¹⁷⁷. We created a binary variable for poor expectations that equalled one if expectations were poor and zero otherwise.

CONFOUNDING VARIABLES

In addition to age, sex, and city, we included as confounders two variables for health status (subjective health and long-term illness), and four variables related to SES (McArthur Scale of SSP, FAS, and parents’ employment and education) ^{157,178,179}. We control for SES mainly for two reasons. Firstly, the stratification of society according to classes creates an unequal distribution of economic resources, but also of beliefs, values, circumstances, chances and skills ¹²⁹. For example, the parental education predicts the expectations of living until age of 35, and might mediate the relationship with health behaviours ¹⁷⁵. Secondly, low SES persons are more focused on satisfying the short-term necessities, and less room to think about the future needs or planning ¹⁸⁰.

The SSP corresponded to the 10-category answers to the question “Imagine that this ladder pictures how country society is made up. Fill in the circle that best represents where your family would be on this ladder” ¹⁷⁸. Given the low number of cases in some categories, we categorized this variable into country-specific tertiles.

The FAS is a widely used instrument to measure SES ¹⁵⁷. It gathers information about four different questions: “does your family own a car, van or truck?”, “do you have your own bedroom?”, “how many computers/laptops/ tablets does your family own?”, and

“during the past 12 months, how many times did you travel away on holiday with your family?”. Those were summed up to obtain a category variable representing family wealth. This final variable was categorized into country-specific tertiles, due to low number of cases in some categories.

Mother and father education were assessed by the questions “what is the highest level of schooling your father /mother attended?”. As the education levels differed across countries, we normalized the education into the categories *high*, *medium*, and *low*. Employment binary variables were also used, based on negative answers to the question “was your father/mother working last two weeks?”.

The health status was measured by the self-reported health and long-term illness^{179,181}. Self-reported health was assessed by the question “would you say your health is...?”. The options were “excellent”, “good”, “fair”, and “poor”. A binary variable for illness was based on answer “yes” to the question “do you have a long-term illness, disability or medical condition?”.

STATISTICAL ANALYSIS

Multivariate regressions modelled separately the probability of smoking, being moderate to severe nicotine dependent, being binge drinker, and using cannabis/marijuana and multiple risk, as a function of expectations, adjusting for age, sex, city, and health status (model 1). In a second model we also adjusted the multivariate regressions for SES, and observed the impact on the coefficient for expectations, to check if the expectations were confounded by SES. Risk behaviours were first estimated through a latent variable, $RISK^*$, as function of expectations (EXPECT), adjusting for confounders (CONFOUND), using a naïve probit model, as follows:

$$RISK_i^* = \beta_0 + \beta_1 EXPECT_i + \beta_2 CONFOUND_i + \varepsilon_1, \tag{Equation 6}$$

such that $RISK_i = \begin{cases} 1 & \text{if } RISK_i^* > 0 \\ 0 & \text{if } RISK_i^* \leq 0 \end{cases}$

The major statistical difficulty was the risk of reverse causation (also often referred as endogeneity) or unobserved heterogeneity. Risk behaviours are likely to be influenced by expectations, but the contrary might be also true. The adolescents adopting risky lifestyles may be more pessimist about their future life because they are aware that their lifestyle is potentially harmful. The fact that the questionnaire included several questions about health behaviours may also have induced adolescents to answer in a less naïve way the questions related to expectations (which were at the end of the

questionnaire). Another possibility is that an unobserved variable influences both expectations and smoking.

Although the sense of causality can hardly be assessed in a cross-section study, available econometric techniques contribute to address the issue of endogeneity, namely the instrumental variable (IV) approach ¹⁸². The idea of the IV strategy is as follows. The explanatory variable – in this case, *EXPECT* – is substituted in the model by its predicted value, obtained by regressing *EXPECT* on a so-called “instrument variable” (call it *Z*). The variable *Z* must have the property of being associated to *EXPECT*, which it substitutes, but unrelated to *RISK*, besides its indirect effect through *EXPECT*. By doing so, we remove the endogeneity from the naïve probit by substituting the variable that creates this endogeneity (*EXPECT*) by an instrument (for more technical details, see Cameron and Trivedi ¹⁸²).

We used as instrumental variable the percentage of classmates with poor expectations (denoted as *CLASS_EXPECT*). The rationale to use this instrument was that adolescents’ expectations were related to those of their peers, because peers are likely to share experiences, feelings, and views over life ^{67,183}. Exposure to positive expectations, and feelings of acceptancy and respect from peers are related with future expectations ¹⁸³. However, since adolescents might establish friendship with peers who share the same characteristics, attitudes, and behaviours we used instead the classmates’ expectations since they are not subject to selection effects, while spending a great part of their lives together ⁶⁴. Meanwhile, classmates’ expectations were unlikely to influence the adolescent’s lifestyle, except indirectly through the effect on the adolescent’s own expectations. In a nutshell, we considered that classmates’ expectations possessed the characteristics to be a good instrument. On the basis of this information, we created a variable for the percentage of classmates with poor expectations (excluding the individual contribution to that percentage). To account for endogeneity, we estimated a bivariate probit model because both dependent variables are dichotomous ¹⁸⁴. We thus estimated:

$$RISK_i^* = \beta_0 + \beta_1 EXPECT_i + \beta_2 CONFOUND_i + \varepsilon_1,$$

Equation 7

such that $RISK_i = \begin{cases} 1 & \text{if } RISK_i^* > 0 \\ 0 & \text{if } RISK_i^* \leq 0 \end{cases}$

$$EXPECT_i^* = \beta_0 + \beta_1 CLASS_EXPECT_i + \beta_2 CONFOUND_i + \varepsilon_2,$$

Equation 8

such that $EXPECT_i = \begin{cases} 1 & \text{if } EXPECT_i^* > 0 \\ 0 & \text{if } EXPECT_i^* \leq 0 \end{cases}$

Afterwards, we adjusted both regressions for SES, in order to check whether the impact of expectations was confounded by SES, i.e., if the relation between expectations and risk behaviours is merely spurious, and the relation found between them is due to an influence of SES in both variables.

The error terms, ε_1 and ε_2 , were assumed to follow a bivariate normal distribution, and with a correlation factor between errors denoted by ρ ^{182,185}. We tested whether the risk behaviours were endogenous through the Hausman test^{182,185}. To test whether the percentage of poor expectations in class is a good instrumental variable of individual poor expectations we performed several tests^{182,185–187}:

- i. We analysed if the R squared of the first stage regression (Equation 8) was sufficiently high.
- ii. We checked if the dimension of the partial R squared was sufficiently high. This is an R squared that results from the elimination of the exogenous variables of the regression.
- iii. We performed a *F* statistic test for the joint significance of the instrument excluded from the structural model. This statistic is compared with the rule of thumb of 10.
- iv. If the *F* statistic is above 10, we compared it with the critical value of 16.38. When the statistic exceeds the critical value the null hypothesis of a weak instrument can be rejected.

For each of the dependent variable, we compared the naïve probit assuming the exogeneity of expectations with the bivariate probit using the instrumental variables. Since our models did not allow estimate odds ratios, we presented the results as marginal effects (the change in predicted probabilities when the binary variable varies from 0 to 1) for the probit model. For the bivariate probit model we calculated average treatment effects (ATE), which are interpreted exactly as marginal effects, namely the change in expected smoking when expectations change from great to poor. The calculation of ATE consists in the difference between predicted probabilities when expectations are poor and predicted probabilities when expectations are great.

RESULTS

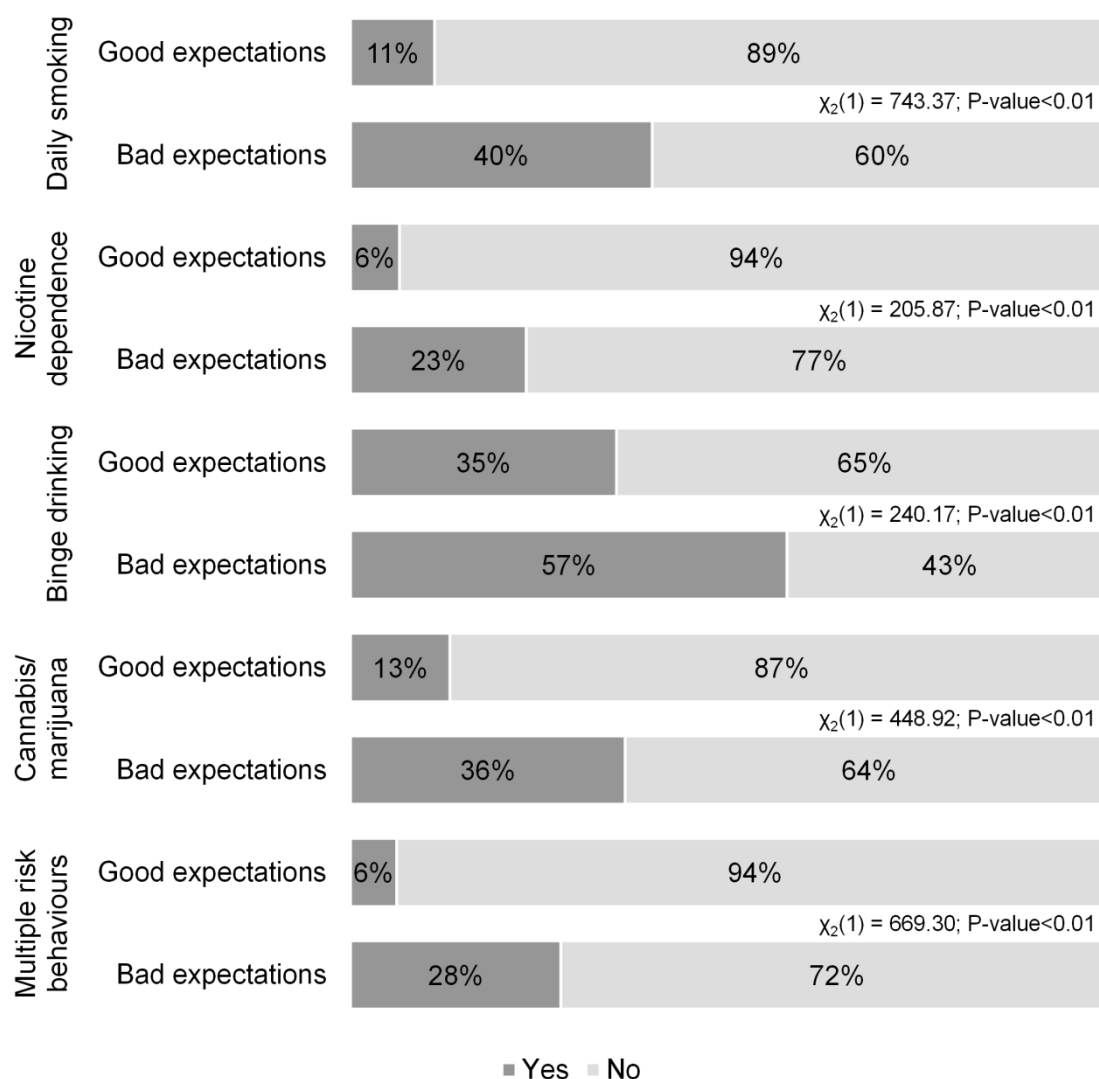
Descriptive statistics are presented in Table 11. Around 13% of adolescents had poor expectations about their future health or life expectancy. Adolescents had on average 12% of classmates with poor expectations. A percentage of 14.8% of adolescents smoked daily, 9.5% were moderate to severe nicotine dependent, and 37.8% engaged in binge drinking in the last 12 months. Additionally, 16.1% of adolescents had ever used marijuana. Around 9% of the students had multiple risk behaviours. The majority (54.2%) reported a good health status and only 20.4% reported to have a chronic illness. The percentage of adolescents behaving risky was higher among those with poor expectations than among those with good expectations (Figure 11). We rejected the hypothesis that the distribution of the behaviours was identical across the expectancies ($p < 0.01$).

Table 11. Descriptive statistics of the study population, SILNE 2013 survey

	Frequency	Percentage
Demographics		
Age		
Less than 15 years old	2,695	25.0
15 to 17 years old	7,791	72.2
More than 17 years old	268	2.5
Boys	5,146	47.9
Expectations about the future		
Poor expectations	1,320	12.6
Classmates with poor expectations (mean) [S.D.]	(12.0)	[10.7]
Risk behaviours and severity of behaving		
Daily smoking	1,575	14.8
Binge drinking	3,993	37.8
Cannabis/marijuana	1,712	16.1
Moderate to severe nicotine dependence	514	9.5
Multiple risk behaviours	956	8.9
Health and disease		
Health status		
Excellent	3,794	35.4
Good	5,809	54.2
Fair	1,018	9.5
Poor	107	1.0

Long-term illness, disability or medical condition	2,175	20.4
SES		
Paternal education		
Low	2,286	26.0
Mid	3,397	38.6
High	3,123	35.5
Maternal education		
Low	1,909	21.0
Mid	3,822	42.0
High	3,367	37.0
Parental employment		
Father not working	1,043	10.4
Mother not working	2,134	20.4
SSP		
Low	4,647	44.1
Mid	3,693	35.1
High	2,196	20.8
FAS		
Low	5,539	51.3
Mid	3,306	30.6
High	1,949	18.1
City		
Namur (BE)	2,059	19.1
Tampere (FI)	1,483	13.7
Hannover (DE)	1,416	13.1
Latina (IT)	2,063	19.1
Amersfoort (NL)	1,900	17.6
Coimbra (PT)	1,873	17.4

Figure 11. Percentage distribution of poor and good expectations within the individuals that behaved risky. (SILNE, 2013)



Note: Qui-squared tests for identical distribution of observations between classes.

The average marginal effects for the naïve probit are presented in Table 12. The first model was not adjusted for SES and in the second model all SES variables were also introduced. Poor expectations were positively and significantly related with all risk behaviours ($p < 0.01$). Poor expectations increased the likelihood of smoking daily by 16 percentage points, nicotine dependence by 10 percentage points, binge drinking by 14 percentage points, cannabis/marijuana use by 12 percentage points, and multiple risk behaviours by 10 percentage points. These relations were not modified by the introduction of SES variables.

Table 12. Average marginal effects (standard errors) for the likelihood of behaving risky (naïve probit).

	Daily smoking	Nicotine dependence	Binge drinking	Cannabis/marijuana	Multiple risk behaviours
Model 1 - not adjusted for SES					
Poor expectations	0.16*** (0.01)	0.10*** (0.01)	0.14*** (0.01)	0.12*** (0.01)	0.10*** (0.01)
Pseudo R ²	0.12	0.10	0.08	0.12	0.13
Model 2 - adjusted for SES					
Poor expectations	0.15*** (0.01)	0.09*** (0.01)	0.14*** (0.02)	0.14*** (0.01)	0.10*** (0.01)
Pseudo R ²	0.13	0.11	0.09	0.12	0.14

Note: Table presents the average marginal effects for the naïve probit model, adjusted for sex, age, health status, and city. Confidence levels: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

Table 13 displays the results for the main regression of the bivariate probit model. For the sake of brevity we only describe the coefficients and ATE for the variable of interest (poor expectations), however the complete bivariate probit model can be found in Table 18 and Table 19 (Appendix). We assessed the extent to which classmates' expectations could be considered as good instrument. First the individual poor expectations was significantly correlated with the classmates' expectations (correlation = 13%, $p < 0.000$). The R squared of the first stage regressions was around 0.11, thus we did not consider that there was a severe loss of precision due to instrumental variable estimation, besides the lower values for the partial R squared (ranging between 0.004 and 0.006). All the F-statistic for the significance of the instruments excluded from the structural model were above the rule of thumb of 10, widely used in the literature and significant for all risk behaviours^{186,187}. Also, we rejected the null hypothesis of weak instruments at the 5% level with a rejection rate of at most 10%, since the F statistic exceeded the critical value of 16.38^{186,187}. So classmate's expectations were not a weak instrument.

Table 13. Results of the bivariate probit model for the association between risk behaviours (and severity) and individual poor expectations (instrumented by percentage of classmates with poor expectations).

	Daily smoking	Nicotine dependence	Binge drinking	Cannabis/marijuana	Multiple risk behaviours
Model 1 - not adjusted for SES					
Poor expectations					
β	1.16*** (0.22)	1.17*** (0.27)	0.16 (0.25)	0.38 (0.31)	1.00***(0.24)
ATE	0.32	0.26	0.05	0.09	0.20
Model 2 - adjusted for SES					
Poor expectations					
β	1.12*** (0.29)	0.78** (0.37)	-0.05 (0.29)	0.39 (0.36)	0.75** (0.33)
ATE	0.30	0.13	-0.02	0.01	0.14
Tests of endogeneity for model 2					
Hausman test	40.39 [0.000]	10.69 [0.001]	0.29 [0.590]	0.31 [0.576]	25.01 [0.000]
Weak instrument test for model 2					
R ²	0.113	0.113	0.114	0.114	0.112
Pseudo partial R ²	0.004	0.006	0.004	0.004	0.000
F-statistic	28.37 [0.000]	20.78 [0.000]	26.13 [0.000]	28.21 [0.000]	27.05 [0.000]

Notes: Table presents the coefficient and Average Treatment Effect (ATE) for the main equation of the bivariate probit model, adjusted for sex, age, health status, SES and city. Standard errors are presented in round brackets and p-values on squared brackets. Confidence levels: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$.

The Hausman test rejected the exogeneity condition for daily smoking, nicotine dependence, and multiple risk behaviours. Thus, the errors between Equation 7 and Equation 8 were correlated for daily smoking, nicotine dependence, and multiple risk behaviours, and the instrumental variable approach (through bivariate probit model) was more adequate to estimate these behaviours. For binge drinking and cannabis the exogeneity condition was not rejected, so the probit was more adequate to model those behaviours.

The coefficients for poor expectations were of the expected sign, and significant for daily smoking, nicotine dependence, and multiple risk behaviour. As depicted in the line for ATE, adolescents with poor expectations were 32 percentage points more likely to smoke daily than the ones that did not have poor expectations ($p < 0.01$), and were 26 percentage points more likely to be nicotine dependent ($p < 0.01$). Similarly, the

adolescents with poor expectations were 20 percentage points more likely to have multiple risk behaviours. After taking in account the potential endogeneity, the hazard of risk behaving was at least twice as high as compared to that found with the simple probit model. The change in the coefficients' dimension confirms that there is an issue with the naïve probit model. The coefficients for binge drinking and cannabis/marijuana use were not significant. However, as already mentioned for cannabis and binge drinking the probit model was a more adequate specification.

The coefficients and ATE for poor expectations did not change to a large extent with the introduction of SES variables in the model for daily smoking. For nicotine dependence, when adjusting for confounding in SES, the coefficients and ATE decreased, from 26 percentage points to 13 percentage points. However, the relation between expectations and nicotine dependence remained strong and significant. For multiple risk behaviours, the ATE decreased from 20 percentage points ($p < 0.01$) to 14 percentage points ($p < 0.05$). Thus, the relation of expectations with nicotine dependence and multiple risk behaviours was only slightly confounded by SES.

Additionally, Table 20 (Appendix) provides a supplementary analysis for the likelihood of having individual poor expectations adjusted by SES variables (naïve probit model). The poor expectations are more common amongst those with poor health status ($p < 0.01$), whose father was not working ($p < 0.05$), and from lower SE positions ($p < 0.05$).

DISCUSSION

KEY FINDINGS

Our results showed that poor expectations about future health and life expectancy increased the likelihood of smoking daily, being moderate to severe nicotine dependent, engage in binge drinking, using marijuana or cannabis, and having multiple risk behaviours. In the case of tobacco use, adolescent's poor expectations about future health or life expectancy were endogenous, i.e., not only having poor expectations increased the likelihood of behaving risky, but also adolescents do take into account the harm of smoking when making expectations about their future. This was also verified for multiple risk behaviours. When accounting for this endogeneity, the effect of expectations remained significant and increased in magnitude, reaching values of 32 percentage points on smoking, 26 percentage points on nicotine dependence, and 20 percentage points on multiple risk behaviours. The importance of expectations on nicotine dependence and on multiple risk behaviours decreased

slightly but remained significant and of high magnitude when the SES variables were factored in.

INTERPRETATIONS

Risk behaviours, and severity of risk behaving in adolescence shape adult risky behaviours and contribute to future health^{19,69}. The inter-temporal lifestyles are crucially dependent of time preferences and expectations are crucial parameters in taking decisions about healthy lifestyle, as stressed by the economic health capital model¹⁸⁸. The psychosocial literature also highlights the relevance of future expectations in shaping adolescents' attitudes and emotions. In this paper, we showed that adolescents' expectations were indeed significant determinants of different risk behaviours among adolescents. Our findings for adolescents confirmed previous literature about future expectations and risk behaviours^{43,92-94,170,171}. However, and in contrast with the previous literature, we showed the consistency of the expectations' influence across different risk behaviours. By doing so, our study provides a more robust validation of the economic and psychosocial theories, showing that future prospects shape lifestyles among adolescents, and not only specific behaviours.

Also in addition to previous studies, we showed the existence of reverse causation on smoking habits, which highlighted the importance of this behaviour in shaping adolescents' expectations, indicating how smoking has been integrated as a life-threatening habit. Our findings clearly indicate that not accounting for endogeneity leads to the under-estimation of the effect of future expectations. The persistence of the association when addressing the issue of endogeneity additionally shows that future expectations are important for risk behaviours and severity of risk behaving. Finally, the role of SES was not confirmed as relevant confounding factor, showing the independent effect of expectations as driver of behaviours.

Contrary to expected, the estimations using the IV approach were larger than with the simple probit model. The main possible explanation is that the instrument is capturing other unobserved contextual variables of the class that influence expectations, and thus indirectly influence risk behaviours. Examples of these contextual factors may relate to opportunities given by the teachers, to the class environment, or to the social capital. Considering that these context variables are certainly exogenous – i.e., not influenced by the adolescent's smoking behaviour – , these confounding factors of the IV do not represent a major problem.

LIMITATIONS

This study has some limitations. First, self-reporting risk behaviours can be subject to underreporting, particularly in adolescents. However, this study meets most requirements to be considered accurate, like being a self-administered questionnaire that ensures privacy and confidentiality to the participants ¹⁶⁵. Second, we used two indicators of expectations that may not be sufficient to evaluate adolescents' perspectives for the future, because they only refer to health and not to future income, social position, or "happiness". Sipsma et al. refer indeed that expectations are a multidimensional construct ⁶⁷. However, the same authors demonstrate that expectations about early death are those more linked to risk behaviours. Also, given the issue under scrutiny, these questions were accurate, although possibly incomplete. Third, although the IV approach has been increasingly used to show causality, this strategy is not as powerful as a study based on a longitudinal design, which would allow evaluate whether the adoption of risk behaviours is preceded by poor expectancies.

CONCLUSIONS

Future expectations are consistently and largely associated to unhealthy lifestyles. This was confirmed from the instrumental variable approach. From a methodological viewpoint, our study points that future research about expectations should employ a method to address the issue of endogeneity, to avoid biased estimates. As regards policy implications, our findings mainly highlight the importance of policies that focus the future consequences of risky behaviours on health and longevity. As the shaping of expectations begins early in life, providing only general information about the risks of smoking, for example, may have a limited impact if one does not consider adolescents' perceptions about their future. Information must highlight life course determinants of health and longevity, showing that future is not predefined but self-determined. A synonym of future expectations in the literature is prospective life course, which reflects their importance for future life planning ⁶⁷. The intervention programs that encourage positive expectancies, through activities that enhance problem solving, selecting and defining obtainable sub-goals, and decision, may be fundamental to decrease the prevalence of risk behaviours among adolescents ¹⁸⁹.

The theory of planned behaviour can help formulate the contents of policies. This theory suggests that what determines behaving is the intentions (plans to behave) of performing that behaviour and the perceptions about behavioural control ¹⁹⁰. Thus, changing the perceptions of control over a behaviour might alter the intentions of

behaving, and thus the behaviour itself. According to that theory, changing the perceptions of control is possible by experiencing performance accomplishments (for example by experiencing personal mastery by setting and achieving sub-goals), observing others performing successfully activities, using persuasion techniques, and controlling feelings of anxiety (e.g., relaxation methods) ¹⁹⁰.

7 CONCLUSION

Despite the well-known health consequences of smoking, the tobacco epidemic is widely spread around the world. In addition to its high prevalence, the smoking behaviour is also unequally distributed. Indeed, a persons' social position influences the chances of smoking, and consequently, the likelihood of suffering from TRDs and early death. Although several theories (which we presented in the introduction) seek to explain the emergence of smoking behaviour and its social patterning, much remains to be understood in this area. Firstly, little evidence has been produced so far on Portuguese SE inequalities in smoking, and its evolution across time. Secondly, there is also a lack of evidence about the causes of the emergence of SE inequalities, especially among youths. This thesis had two main objectives: (1) to measure the SE inequalities in smoking in Portugal, their evolution over the recent years, and the consequences on SE inequalities in health; and (2) to investigate how smoking inequalities emerge during adolescence. The main results are summarized and discussed below.

7.1 KEY FINDINGS

7.1.1 Socioeconomic inequalities in smoking in Portugal, and their consequences

Little evidence for Portugal has been produced so far on the relationship between SES and tobacco, and to the best of our knowledge, no study had been carried out about its evolution across time. Knowing changes in smoking SE inequalities in Portugal is important for at least three reasons. First, it provides insights about the stage of the smoking epidemic in Portugal. Second, this information is relevant to estimate potential consequences on future inequalities in health, and thus the dimension of the threat for public health. Third, it provides evidence for tailoring anti-tobacco policies to address the situation in Portugal.

The measure of SE inequalities in smoking in Portugal and the study of their evolution showed a reversal in SE inequalities in smoking over the 1987 to 2006 period amongst men. In the last survey, inequalities in smoking favoured the more educated and wealthier, contrarily to what is seen in earlier surveys. Contributing to this result are mainly the higher cessation amongst the high SE individuals, observed in all the NHIS, coupled with higher initiation amongst low SES in the first three NHIS for the younger cohorts (born between 1960 and 1969). Among women, similar trends were observed, but the magnitude of the trend was not large enough to reach a reversal in inequalities.

Women with lower education and income levels were less likely to smoke in all of the surveys analysed, although to a lower extent in the last one.

These results confirmed that women lag behind men in the SE inequalities in smoking. This may indicate that Portugal is in an earlier phase of the epidemic compared with other European countries, or that it has followed a different path. The first is the explanation closest to the different trends observed among women. Indeed, both the late emancipation of women and the conservative environments are the reasons mentioned more often for the later reversal on inequalities in Southern European countries ¹¹⁵. The recent disappearance of resistance to female smoking created by female emancipation probably helped to increase the smoking prevalence among women. It is expected that in the coming years women's trends will converge to those observed among men, with the reduction of smoking initiation and higher smoking cessation among the more educated, as is observed in the other European countries. Our results also reveal worrisome inequality trends, especially amongst the youngest cohorts, when lifestyles are being defined. Young adulthood is therefore a crucial moment to target with anti-tobacco policies, such as price increases, which seem more effective among poorer individuals or those employed in manual occupations ⁴⁰.

This observed reversal of SE inequalities in Portugal, with greater prevalence of tobacco consumption among the poor and less educated men, was reflected in the SE inequalities of TRDs for the year of 2011. The SE inequalities in TRDs in Portugal were measured using a newly created SES indicator, having two components, which captured the SE profile of Portuguese parishes (*freguesias*). Using a large database of inpatient stays, the relationship between TRDs and the area-based indicator were strong and significant. Upper-social-class areas were associated with a lower prevalence of TRDs, such as malignant cancers, and cardiovascular and respiratory diseases.

The concerns about the reversal and growing SE inequalities in smoking in Portugal were thus confirmed by the analysis on TRDs: the inequalities in smoking appear already for the year 2011 to be reflected in the SES patterning of inpatient stays related with smoking. Therefore, we predict an increase of inequalities in health and mortality, and that they will be unfavourable to the less privileged in the future. These results reinforce the above-mentioned need for policies that seek to reduce the inequalities in smoking, such as tobacco taxation or pricing ⁴⁰, and also suggest that targeting the less privileged areas could be a solution in order to decrease inequalities in health.

7.1.2 Socioeconomic inequalities in smoking in adolescents, and their causes

Earlier reported findings, and especially the worrisome trends of SE inequalities among youths, led us to investigate the SE inequalities in smoking among adolescents, and their causes. To that end, this thesis focused on adolescents in the last two chapters, in order to understand how inequalities emerge or persist, and what might be effective policies to address this issue. The third work studied the association of smoking between parents and their children, and its role in explaining SE inequalities among adolescents. The last work studied how expectations about future life and health shape adolescents' lifestyles.

According to our information there were no studies addressing the importance of SES on the pattern of transmission of smoking. Earlier studies have examined the impact of having smoking parents on adolescents, but have not investigated if the impact was differentiated according to the SE background. Regarding Portuguese evidence, existing studies have only evaluated knowledge on smoking and smoking habits in adolescence ¹⁹¹, and described the self-reported reasons for starting to smoke ¹⁹². Knowledge about transmission patterns of smoking between parents and adolescents would allow for designing policies that aim to break the inequalities chain.

The association between parents and children's smoking behaviour was established. However, the association was similar across different SES, not confirming the hypothesis of greater susceptibility among the lower SES adolescents. Nevertheless, since the low SES males smoke more, as observed in the previous chapters, and confirmed for most European countries ²⁸, the exposure to smoking parents is greater in families from low SE background. Thus, although the susceptibility is the same, the trends of SE inequalities in smoking could be maintained due to a higher prevalence of smoking among the low SES parents. In conclusion, SE inequalities are persistent across generations, and the association between parental smoking and adolescent smoking is about the same between SE groups. Thus, policies to prevent tobacco use in adulthood might start by addressing parental smoking behaviour, so that the adolescent smoking can be reduced, and simultaneously reducing its social patterning.

The study about the impact of future expectations on smoking behaviour was different from the previous evidence since it focused on several risky behaviours, and allowed extending the discussion to different risk attitudes. We also developed a method to account for reverse causation, which has not been addressed in previous studies. Indeed, it was likely that adolescents form their expectations on the basis of their

current lifestyle. The use of instrumental variables allowed for reducing the bias due to reverse causation, and thus for measuring the causality more accurately.

Poor expectations about the future life and health increased the likelihood of daily smoking, having other risks behaviours, namely, binge drinking, and cannabis use, and also of severity of behaving, such as nicotine dependence and the accumulation of several risk behaviours. Also, the results showed that adolescents do take into account the impact of smoking when making expectations about their future life and health. This last study also tested if the relationship between expectations and risk behaviours was due to an influence of SES in both variables. The role of SES was not confirmed: future expectations had an important and independent effect on risk behaviours. However, the poorer expectations were more common among the adolescents from low SES families, in particular, those with an unemployed father. These results confirm the role of future expectations on influencing goal setting and planning, and regulating attitudes and emotional well-being ⁶⁷, highlighted by psychosocial theories. The future expectations are crucial for the definition of later outcomes and life chances. According to the theory of planned behaviour ¹⁹⁰, policies that promote the improvement of personal mastery by setting and achieving sub-goals, the use of persuasion techniques, and controlling feelings of anxiety (e.g., relaxation methods) could alter the intentions to behave, and thus the behaviour itself.

7.2 PATHWAYS OF CHANGE

The reduction of inequalities will contribute to a better society since most often they are actually unfair and avoidable; the tackling of inequalities would ultimately improve the overall health status of the population, either by improving the health conditions of the less privileged, or by reducing negative health externalities ^{36,107}. Thus, what must be done?

ECONOMIC PATHWAYS

The most recent research about the impact of interventions in SE inequalities in smoking revealed that one of the most effective measures is to increase prices and/or taxes on tobacco related products, either among adults ⁴⁰ or youths ⁴¹. As seen in the TORA model, consumption of addictive goods is responsive to prices. According to Chaloupka and Warner ¹⁹³ the price elasticity for cigarettes ranges from -0.3 to -0.5.

Nevertheless, taxation and price increases also have some drawbacks. They might impose a regressive burden on those who are more vulnerable to smoking, such as persons with a genetic predisposition to smoking, or those in the low SE strata of the

population. The higher prices and taxation can increase also the cross-border purchasing of cigarettes. Cross-boarder shopping is more common in countries with lower cigarette prices, and this practice is more common among the higher SES individuals¹⁹⁴. This practice can ultimately increase the social patterning of smoking. A tax increase should be followed by a reduction in the number of cigarettes that can be legally imported across borders¹⁹⁴, to prevent cross-boarder shopping. However, the impact of purchasing in the informal market cannot not be easily prevented.

To some extent, youth should be more price sensitive than adults: (i) young smokers are less addicted because they have smoked for less time than adults, (ii) a greater percentage of youth's disposable income is dedicated to the purchase of cigarettes, (iii) they are more present oriented, and (iv) policies applied to youths will have *spillover* effects due to peer influences on smoking¹⁹³. However, less is empirically known about the impact of price changes and taxation in adolescent smoking⁴¹. Moreover, the existing evidence of impact of financial incentives on youths is still contradictory^{195,196}.

Although our knowledge about the impact of policies on inequalities is still in its very early stages, there are some clues about the most appropriate actions. However these may be insufficient to tackle inequalities appropriately, and so this thesis highlights other possible pathways.

SOCIOLOGICAL PATHWAYS

Policies could also be focused on the creation of healthy places and communities, by imposing bans on smoking in public and private places. Strong restrictions on smoking can reduce smoking behaviours¹⁹⁷, but the effects on inequalities are uncertain¹⁹⁸. Bans create additional costs to smokers, and produce commitment incentives, because smokers have to pay fines if they do not comply with the bans, and have to go outside to smoke.

School smoking policies have the advantage of reducing the smoking levels on school premises¹⁹⁸. However, the effect on smoking inequalities is still not clear. Schools with a positive climate, equally supportive, and with prevention programmes targeted to high risk disadvantaged students might help to lower smoking inequalities¹⁹⁹.

Results from the chapter 6.1 of this thesis show that it is important to create positive examples in families and communities, and live in smoke-free environments, since parents are role models and the replication of behaviours happens regardless of the SES of the family. In fact, the frequency of observation of adult smoking is linked with the perception that smoking is acceptable²⁰⁰. Therefore, policies seeking to prevent adolescent smoking may start with parental smoking cessation. By targeting parents,

policies therefore have the potential to not only decrease adolescents' smoking but also its social patterning. Some interventions addressing youth smoking through parents have also already proved to be effective. For example, an intervention in the United States combined a children-targeted risk-reduction programme with an intervention aimed at improving the parents' monitoring and communication skills about risk behaviours ¹⁶¹. Similar experiences have been successfully developed for preventing alcohol consumption and high-risk sexual behaviours among adolescents ¹⁶²⁻¹⁶⁴.

PSYCHOSOCIAL PATHWAYS

To achieve a behavioural change it is important to maximize adult and adolescent capabilities and control over their own lives, empower individuals, and foment positive expectations and hope about the future ²⁰¹. Positive control beliefs might therefore be protective for health in low SE groups.

Fairer employment, avoidance of deprivation, greater participation, and improvement of working conditions are important to create lower-stress environments ^{88,89}, and thus to mitigate the social differences in health and health habits. Lower stress levels act as a protective resource, which could lead to multiplicative effects on health, since higher stress promotes smoking, but smoking can even worsen the stress levels.

This thesis highlights that intervention programmes that encourage positive expectancies, through activities that enhance problem solving, selecting and defining obtainable sub-goals, and decision, are fundamental to decrease the prevalence of risk behaviours among adolescents ¹⁸⁹. The programmes that promote the improvement of personal mastery by setting and achieving sub-goals, the use of persuasion techniques, and controlling feelings of anxiety (e.g., relaxation methods) could alter the intentions to behave in risky ways ¹⁹⁰.

7.3 FURTHER INVESTIGATION

This thesis had two main sections. The first measured the trends in Portuguese SE inequalities in smoking, and its consequences on health in Portugal, and the second investigated possible causes of smoking inequalities during adolescence. During the main investigation, several other interesting questions arose that deserve attention in further investigations. I present some of them below.

Regarding the descriptive analysis, the chapter 5.1 of this thesis established a profile of the Portuguese SE inequalities in smoking, based on the most recent NHIS available, from 2005/2006. However, at the time the thesis was finalized, the preliminary results

of the 2014 NHIS were disclose. Therefore, the next step is to update the profile of SE inequalities in smoking in Portugal. The current trends indicated that Portugal could be in an earlier phase of the epidemics or that it followed a different path than the other European countries. This last NHIS will allow researchers to question the theory of epidemiological transition, and to know whether (and when) Portugal has passed to a later stage of the epidemic. In the same line, more recent data on in-patient stays at NHS hospitals would allow researchers to confirm the social patterning of TRDs and its recent evolution, as a major consequence of the reversal in the SE inequalities in smoking. This would allow designing more accurate policies, adequate to the specific context of Portugal, and to further assess the impact on TRDs.

Second, all the studies performed made use of cross-sectional methods, which precluded a causality-oriented lifelong view on smoking and its social patterning. In the future, it is fundamental to understand the pathways of inequalities from youth to adulthood. An interesting question has to do with the point at which experimentation with cigarettes in young ages becomes an addiction, and what the role of SES is in that transition. The prevalence of smoking experimentation and daily smoking was relatively high in our sample of adolescents, which parental exposure and expectations evidently contributed to, according to our findings, both of which are related to SE factors. However, it remains unclear how these determinants influence the smoking patterns later in life, transforming it into addictions that are socially marked. At what moment in life does this transformation occur? Do parental exposure and expectations play a role in this transition? When and how is it effective to intervene to avoid the transition to occur? To study those issues, it is essential to use longitudinal designs, which allow the identification of the evolution of the SES, the social mobility, and the changes in smoking behaviour, and to infer about the variations in the inequality in those behaviours. Also, longitudinal designs would allow disentangling the causality of intergenerational transmission of smoking behaviour.

Third, in the same lifespan perspective, it would be valuable to know more about adolescents' early life and childhood experiences to better understand how smoking and its social patterning emerge. There is evidence that adverse childhood experiences influence the likelihood of smoking during adolescence ²⁰². The role of future expectations may be a mediator through which these experiences affect smoking behaviours, and parental smoking may also be linked to other types of parental substance abuse. Also, the childhood experiences may help to explain the social patterning of smoking during adolescence and later in life. Questioning adolescents

about past experiences, but also about possible proxies (i.e., their mental well-being), could contribute to these further objectives.

Finally, it is important to identify the most appropriate interventions according to the risk groups. Large-scale interventions have been increasingly adopted across European countries, including pricing and taxation and bans on sales to minors, which have been demonstrated to be effective in reducing smoking among youths ⁴¹. These interventions, however effective they may be, will not be able to address the more specific issues raised in this thesis, namely the exposure to parental smoking and the role of expectations. These factors can only be tackled by individual or group interventions, which should certainly be organized at the school level, as the most influential place in adolescents' behaviours. A further step of our research should address the implementation of pilot interventions on parental smoking cessation, improvement of personal mastery, and activities that enhance problem solving and anxiety control, at the school level, using a control group.

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9 APPENDIXES

9.1 APPENDIX 1 – ADDITIONAL TABLES

Table 14. Education categories of NHIS

	1987 (p40) Que grau de ensino completou?	1995 (1.3. estudo) Quais os estudos que tem?	1998/99 1.6. qual o nível de ensino mais elevado que frequentou/ frequentou?	2005/2006 1.3. Quais os estudos que tem?
NA	- Não tem idade para andar na escola	- Não tem idade para andar no ensino básico	- Não tem idade para andar no ensino básico	
No education	- Não sabe ler nem escrever - Só sabe ler e escrever - Frequenta agora o ensino básico	- Não sabe ler nem escrever - Só sabe ler e escrever - Frequenta agora o ensino básico (1º a 9º ano)	- Não sabe ler nem escrever - Só sabe ler e escrever - Frequenta agora o ensino básico (1º a 9º ano)	- Nenhum
Primary first education	- Antiga 3ª classe - 4ª classe - 4ª classe + curso prof.	- Antiga 3ª classe - 4ª classe - 4ª classe + curso prof.	- Antiga 3ª classe - 4ª classe - 4ª classe + curso prof.	- Ensino básico – 1º ciclo
Primary education	- 6ª classe ou antigo 2º ano - 6ª classe + curso prof.	- Frequenta agora o ensino secundário ou o ensino técnico-prof. (10º a 12º ano) - 6ª classe ou antigo 2º ano (ciclo preparatório) - 6ª classe + curso prof. - 9º ano ou antigo 5º ano (curso geral dos liceus)	- Frequenta agora o ensino secundário ou o ensino técnico-prof. (10º a 12º) - 6ª classe ou antigo 2º ano (Ciclo Preparatório) - 6ª classe + curso prof. - 9º ano ou antigo 5º ano (Curso Geral dos Liceus)	- Ensino básico – 2º ciclo - Ensino básico – 3º ciclo
Secondary education	- 9º ano ou antigo 5º ano - 11º ano ou antigo 7º ano - Propedêutico, 12º ano - Ensino médio - Frequenta agora o ensino superior	- Frequenta agora o ensino superior - 11º ano ou antigo 7º ano (curso compl. dos liceus) - Propedêutico, 12º ano	- Frequenta agora o ensino superior - 11º ano ou antigo 7º ano (Curso comp. dos liceus) - Propedêutico ou 12º ano	- Ensino secundário - Ensino pós-secundário
Tertiary education	- Ensino superior	- Ensino médio/superior	- Ensino médio/superior	- Bacharelato - Licenciatura - Mestrado - Doutoramento

Note: NA stands for not applicable.

Table 15. Age-adjusted OR on the probability of being current smoker in Portugal, per NHIS year (N=120,140).

Current smokers	1987	1995	1998/99	2005/06
Education - men				
Tertiary and second.	1.00	1.00	1.00	1.00
Primary education	1.08 [0.93;1.26]	1.36 [1.20;1.54]	1.42 [1.27;1.59]	1.58 [1.41;1.76]
Pre-primary educ.	0.73 [0.65;0.81]	1.08 [0.97;1.22]	1.10 [0.99;1.23]	1.58 [1.41;1.77]
No education	0.89 [0.77;1.02]	1.05 [0.90;1.22]	1.01 [0.86;1.18]	1.54 [1.30;1.82]
Income - men				
1st quintile (+)	1.00	1.00	1.00	1.00
2nd quintile	0.96 [0.85;1.08]	1.03 [0.93;1.15]	0.99 [0.89;1.11]	1.32 [1.17;1.48]
3rd quintile	0.88 [0.78;1.00]	1.00 [0.89;1.11]	0.97 [0.87;1.09]	1.27 [1.12;1.43]
4th quintile	0.86 [0.76;0.98]	1.01 [0.91;1.13]	0.97 [0.86;1.09]	1.42 [1.25;1.61]
5th quintile (-)	0.87 [0.76;0.99]	0.83 [0.73;0.93]	0.92 [0.82;1.04]	1.40 [1.24;1.58]
Education - women				
Tertiary and second.	1.00	1.00	1.00	1.00
Primary education	0.54 [0.42;0.69]	0.60 [0.52;0.70]	0.72 [0.63;0.83]	0.96 [0.84;1.09]
Pre-primary educ.	0.09 [0.08;0.12]	0.15 [0.13;0.18]	0.21 [0.18;0.25]	0.38 [0.32;0.45]
No education	0.04 [0.02;0.06]	0.04 [0.03;0.07]	0.12 [0.08;0.17]	0.12 [0.08;0.19]
Income - women				
1st quintile (+)	1.00	1.00	1.00	1.00
2nd quintile	0.36 [0.29;0.45]	0.43 [0.36;0.52]	0.66 [0.56;0.77]	0.65 [0.55;0.77]
3rd quintile	0.18 [0.13;0.24]	0.41 [0.34;0.50]	0.46 [0.39;0.54]	0.64 [0.54;0.76]
4th quintile	0.17 [0.12;0.24]	0.28 [0.23;0.35]	0.40 [0.33;0.49]	0.56 [0.47;0.68]
5th quintile (-)	0.11 [0.08;0.17]	0.26 [0.21;0.33]	0.33 [0.27;0.41]	0.49 [0.41;0.59]

Legend: 95% confidence intervals in parenthesis.

Table 16. Age-adjusted OR on the probability of being former smoker in Portugal, per NHIS year (N=120,140).

Former smokers	1987	1995	1998/99	2005/06
Education - men				
Tertiary and second.	1.00	1.00	1.00	1.00
Primary education	0.91 [0.74;1.13]	0.77 [0.65;0.92]	0.85 [0.72;0.99]	0.83 [0.72;0.97]
Pre-primary educ.	0.99 [0.86;1.15]	0.79 [0.68;0.93]	0.90 [0.77;1.04]	0.75 [0.65;0.87]
No education	0.69 [0.58;0.83]	0.59 [0.48;0.72]	0.68 [0.55;0.83]	0.55 [0.45;0.68]
Income - men				
1st quintile (+)	1.00	1.00	1.00	1.00
2nd quintile	0.89 [0.76;1.05]	0.89 [0.77;1.03]	0.92 [0.79;1.07]	0.73 [0.63;0.85]
3rd quintile	0.92 [0.78;1.08]	0.92 [0.79;1.06]	0.85 [0.73;0.99]	0.73 [0.63;0.86]
4th quintile	0.84 [0.71;0.99]	0.78 [0.67;0.91]	0.82 [0.70;0.96]	0.64 [0.54;0.75]
5th quintile (-)	0.74 [0.62;0.88]	0.75 [0.64;0.89]	0.82 [0.71;0.96]	0.59 [0.50;0.68]
Education - women				
Tertiary and second.	1.00	1.00	1.00	1.00
Primary education	0.69 [0.43;1.11]	0.87 [0.67;1.13]	0.99 [0.79;1.25]	0.71 [0.58;0.87]
Pre-primary educ.	1.47 [1.03;2.09]	0.70 [0.51;0.96]	0.71 [0.53;0.95]	0.49 [0.37;0.64]
No education	0.85 [0.38;1.93]	1.18 [0.56;2.46]	0.64 [0.34;1.22]	0.43 [0.21;0.88]
Income - women				
1st quintile (+)	1.00	1.00	1.00	1.00
2nd quintile	0.83 [0.56;1.25]	0.94 [0.69;1.29]	0.63 [0.48;0.84]	0.87 [0.67;1.12]
3rd quintile	1.34 [0.82;2.19]	0.65 [0.45;0.93]	0.75 [0.56;1.02]	0.67 [0.50;0.88]
4th quintile	0.86 [0.45;1.65]	0.78 [0.53;1.15]	0.60 [0.41;0.88]	0.64 [0.47;0.87]
5th quintile (-)	1.03 [0.49;2.15]	0.74 [0.47;1.17]	0.70 [0.48;1.03]	0.50 [0.36;0.69]

Legend: 95% confidence intervals in parenthesis.

Table 17. Age-adjusted OR on the probability of being ever smoker in Portugal, per NHIS year (N=120,140).

Ever smokers	1987	1995	1998/99	2005/06
Education - men				
Tertiary and second.	1.00	1.00	1.00	1.00
Primary education	1.02 [0.87;1.20]	1.19 [1.05;1.34]	1.35 [1.21;1.50]	1.45 [1.31;1.60]
Pre-primary educ.	0.57 [0.51;0.64]	0.79 [0.71;0.88]	0.87 [0.79;0.96]	1.22 [1.11;1.35]
No education	0.58 [0.50;0.66]	0.65 [0.57;0.74]	0.69 [0.61;0.79]	1.05 [0.91;1.21]
Income - men				
1st quintile (+)	1.00	1.00	1.00	1.00
2nd quintile	0.85 [0.75;0.96]	0.91 [0.83;1.01]	0.88 [0.79;0.97]	1.08 [0.97;1.20]
3rd quintile	0.78 [0.69;0.88]	0.90 [0.81;0.99]	0.79 [0.71;0.88]	1.00 [0.90;1.11]
4th quintile	0.71 [0.63;0.80]	0.82 [0.74;0.90]	0.79 [0.71;0.88]	1.03 [0.92;1.16]
5th quintile (-)	0.62 [0.55;0.71]	0.60 [0.54;0.66]	0.71 [0.64;0.79]	0.92 [0.83;1.02]
Education - women				
Tertiary and second.	1.00	1.00	1.00	1.00
Primary education	0.46 [0.37;0.58]	0.54 [0.47;0.61]	0.68 [0.60;0.76]	0.77 [0.69;0.86]
Pre-primary educ.	0.09 [0.08;0.11]	0.12 [0.10;0.14]	0.15 [0.13;0.18]	0.23 [0.20;0.27]
No education	0.03 [0.02;0.04]	0.04 [0.03;0.06]	0.08 [0.06;0.10]	0.07 [0.05;0.09]
Income - women				
1st quintile (+)	1.00	1.00	1.00	1.00
2nd quintile	0.32 [0.26;0.39]	0.39 [0.33;0.45]	0.52 [0.45;0.60]	0.55 [0.47;0.63]
3rd quintile	0.18 [0.14;0.23]	0.33 [0.28;0.39]	0.37 [0.32;0.43]	0.48 [0.41;0.55]
4th quintile	0.15 [0.11;0.20]	0.23 [0.19;0.28]	0.30 [0.25;0.36]	0.41 [0.35;0.48]
5th quintile (-)	0.10 [0.07;0.15]	0.22 [0.18;0.27]	0.26 [0.22;0.31]	0.33 [0.28;0.38]

Legend: 95% confidence intervals in parenthesis.

Table 18. First part of the bivariate probit model: association between percentage of classmates having poor expectations and individual poor expectations.

Individuals' expectations	Daily smoking	Nicotine dependence	Binge drinking	Cannabis/marijuana	Multiple risk behaviours
Classmates' exp.	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Boys	0.13*** (0.04)	0.16*** (0.05)	0.13*** (0.04)	0.13*** (0.04)	0.14*** (0.04)
Age					
Less than 15 yo	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
15 to 17 yo	0.03 (0.05)	-0.14* (0.07)	0.03 (0.05)	0.03 (0.05)	0.02 (0.05)
More than 17 yo	0.34*** (0.13)	0.15 (0.15)	0.33*** (0.13)	0.34*** (0.12)	0.34*** (0.12)
Health status					
Excellent	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Good	0.47*** (0.05)	0.43*** (0.07)	0.45*** (0.05)	0.46*** (0.05)	0.46*** (0.05)
Fair	1.25*** (0.07)	1.12*** (0.09)	1.24*** (0.07)	1.26*** (0.07)	1.24*** (0.07)
Poor	2.13*** (0.20)	1.83*** (0.24)	2.09*** (0.20)	2.10*** (0.20)	2.10*** (0.20)
Illness	0.03 (0.05)	0.05 (0.06)	0.05 (0.05)	0.04 (0.05)	0.04 (0.05)
Paternal educ.					
Low	0.05 (0.07)	0.07 (0.08)	0.07 (0.07)	0.07 (0.07)	0.06 (0.07)
Mid	-0.12** (0.06)	-0.11 (0.08)	-0.11* (0.06)	-0.10* (0.06)	-0.11* (0.06)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Maternal educ.					
Low	0.06 (0.07)	0.05 (0.09)	0.08 (0.07)	0.06 (0.07)	0.07 (0.07)
Mid	0.10* (0.06)	0.12 (0.07)	0.11** (0.06)	0.10* (0.06)	0.10* (0.06)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Parental empl.					
Father not work	0.16** (0.07)	0.21*** (0.08)	0.15** (0.07)	0.16** (0.07)	0.15** (0.07)
Mother not work	0.01 (0.05)	0.05 (0.07)	-0.01 (0.05)	0.00 (0.05)	0.00 (0.05)
SSP					
Low	0.14** (0.06)	0.10 (0.08)	0.16** (0.06)	0.14** (0.06)	0.14** (0.06)
Mid	0.09 (0.06)	0.08 (0.08)	0.11* (0.06)	0.09 (0.06)	0.10 (0.06)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
FAS					
Low	0.07 (0.06)	0.05 (0.08)	0.05 (0.06)	0.05 (0.06)	0.07 (0.06)
Mid	0.03 (0.06)	0.00 (0.08)	0.02 (0.06)	0.03 (0.06)	0.03 (0.06)
High					
City					
Namur	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Tampere	-0.39*** (0.09)	-0.41*** (0.12)	-0.44*** (0.09)	-0.42*** (0.09)	-0.42*** (0.09)
Hannover	-0.19** (0.08)	-0.15 (0.11)	-0.26*** (0.09)	-0.22*** (0.08)	-0.23*** (0.08)
Latina	0.01 (0.07)	0.02 (0.08)	-0.06 (0.07)	-0.03 (0.07)	-0.04 (0.07)
Amersfoort	-0.28*** (0.08)	-0.30*** (0.10)	-0.33*** (0.08)	-0.30*** (0.08)	-0.30*** (0.08)
Coimbra	-0.28*** (0.07)	-0.28*** (0.09)	-0.34*** (0.07)	-0.30*** (0.07)	-0.31*** (0.07)
Intercept	-1.94*** (0.10)	-1.60*** (0.13)	-1.89*** (0.10)	-1.90*** (0.10)	1.90*** (0.10)

Confidence levels: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$. ref. = reference category.

Table 19. Second part of the bivariate probit model: association between risk behaviours and individual poor expectations (instrumented by percentage of classmates with poor expectations) expectations

Risk behaviours	Daily smoking	Nicotine dependence	Binge drinking	Cannabis/marijuana	Multiple risk behaviours
Poor expectations	1.12*** (0.29)	0.78** (0.37)	-0.05 (0.29)	0.39 (0.36)	0.75** (0.33)
Boys	0.21*** (0.04)	0.13** (0.07)	0.29*** (0.03)	0.43*** (0.04)	0.30*** (0.05)
Age					
Less than 15 yo	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
15 to 17 yo	0.54*** (0.06)	0.42*** (0.10)	0.69*** (0.04)	0.65*** (0.06)	0.59*** (0.07)
More than 17 yo	0.94*** (0.13)	0.69*** (0.18)	1.11*** (0.11)	1.07*** (0.12)	0.86*** (0.14)
Health status					
Excellent	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Good	0.35*** (0.05)	0.16* (0.08)	0.17*** (0.04)	0.20*** (0.05)	0.29*** (0.06)
Fair	0.60*** (0.11)	0.48*** (0.16)	0.45*** (0.10)	0.53*** (0.13)	0.67*** (0.13)
Poor	0.34 (0.27)	0.51 (0.34)	0.64** (0.26)	0.48 (0.30)	0.72** (0.29)
Illness	-0.08 (0.05)	-0.15* (0.08)	-0.01 (0.04)	-0.08* (0.05)	-0.11** (0.06)
Paternal educ.					
Low	0.14** (0.06)	0.10 (0.10)	0.19*** (0.05)	-0.01 (0.06)	0.09 (0.07)
Mid	0.16*** (0.06)	0.11 (0.09)	0.11** (0.04)	0.02 (0.05)	0.10 (0.06)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Maternal educ.					
Low	0.08 (0.07)	0.09 (0.11)	-0.04 (0.05)	-0.07 (0.06)	0.04 (0.08)
Mid	0.14*** (0.05)	0.17* (0.09)	0.06 (0.04)	0.03 (0.05)	0.15** (0.06)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Parental empl.					
Father not work	0.11 (0.07)	0.06 (0.10)	0.03 (0.05)	0.10 (0.06)	0.15** (0.07)
Mother not work	-0.06 (0.05)	-0.02 (0.08)	-0.16*** (0.04)	-0.13*** (0.05)	-0.04 (0.06)
SSP					
Low	-0.12** (0.06)	-0.12 (0.09)	-0.04 (0.05)	-0.03 (0.06)	-0.04 (0.07)
Mid	-0.09 (0.06)	-0.24*** (0.09)	-0.08* (0.04)	-0.06 (0.05)	-0.09 (0.07)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
FAS					
Low	-0.09 (0.06)	0.06 (0.10)	-0.19*** (0.05)	-0.05 (0.06)	-0.05 (0.07)
Mid	-0.05 (0.06)	0.02 (0.10)	-0.08* (0.05)	-0.08 (0.06)	-0.02 (0.07)
High	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
City					
Namur	(ref.)	(ref.)	(ref.)	(ref.)	(ref.)
Tampere	-0.14 (0.09)	0.08 (0.13)	-0.56*** (0.06)	-0.90*** (0.09)	-0.35*** (0.10)
Hannover	-0.19** (0.09)	0.09 (0.12)	-0.40*** (0.06)	-0.38*** (0.08)	-0.23** (0.10)
Latina	0.33*** (0.06)	0.12 (0.10)	-0.51*** (0.05)	-0.16*** (0.06)	0.08 (0.07)
Amersfoort	-0.21*** (0.08)	-0.08 (0.13)	-0.42*** (0.06)	-0.34*** (0.07)	-0.31*** (0.09)
Coimbra	-0.09 (0.07)	-0.42*** (0.12)	-0.52*** (0.05)	-0.49*** (0.07)	-0.33*** (0.08)
Intercept	-2.11*** (0.10)	-2.19*** (0.16)	-0.65*** (0.07)	-1.57*** (0.09)	2.33*** (0.11)

Confidence levels: * for p<0.10, ** for p<0.05, and *** for p<0.01. ref. = reference category.

Table 20. Average marginal effects (standard errors) for the likelihood of having individual poor expectations adjusted for SES (naïve probit).

	Expectations		
Boys	0.02	***	(3.30)
Age			
Less than 15 years old	0.01		(0.62)
15 to 17 years old	0.06	***	(2.96)
More than 17 years old	(ref.)		
Health status			
Excellent	(ref.)		
Good	0.07	***	(8.59)
Fair	0.21	***	(18.14)
Poor	0.34	***	(10.73)
Illness	0.01		(1.07)
Paternal education			
Low	0.01		(1.18)
Mid	-0.02	*	(-1.69)
High	(ref.)		
Maternal education			
Low	0.02		(1.34)
Mid	0.02	*	(1.93)
High	(ref.)		
Parental employment			
Father not working	0.02	**	(2.28)
Mother not working	0.00		(-0.42)
SSP			
Low	0.03	***	(2.87)
Mid	0.02	**	(2.05)
High	(ref.)		
FAS			
Low	0.01		(1.27)
Mid	0.01		(0.72)
High	(ref.)		
City			
Namur	(ref.)		
Tampere	-0.09	***	(-6.37)
Hannover	-0.06	***	(-4.43)
Latina	-0.02	**	(-2.27)
Amersfoort	-0.08	***	(-6.29)
Coimbra	-0.07	***	(-6.53)

Confidence levels: * for $p < 0.10$, ** for $p < 0.05$, and *** for $p < 0.01$. ref. = reference category.

9.2 APPENDIX 2 – STUDENT QUESTIONNAIRE



Eu, a minha escola e a minha saúde

Questionário aos alunos

Antes de começares, lê o seguinte, por favor.

Este questionário faz parte de um estudo internacional sobre o tabagismo nos estudantes europeus, com o apoio financeiro da Comissão Europeia. O estudo chama-se SILNE.

A maioria das questões é sobre tabagismo, e existem simultaneamente questões sobre os teus amigos, a tua família, a tua saúde e os teus hábitos de saúde. Este questionário vai ajudar-nos a compreender melhor o tabagismo nos jovens. Será respondido por cerca de 8.000 estudantes como tu, de cinco países diferentes.

Este questionário é confidencial; todas as informações serão mantidas em sigilo e nenhum nome será usado. Depois de responderes, deverás colocar o teu questionário preenchido dentro do envelope em anexo e seres tu próprio a fechá-lo. O responsável pelo inquérito recolherá os envelopes, depois de teres preenchido o questionário.

Em Portugal o inquérito é realizado pela Escola Nacional De Saúde Pública. A participação é voluntária. É importante que respondas tão atenta e francamente quanto possível. Os resultados não serão publicados por escola nem individualmente por turmas. Lembra-te: as tuas respostas serão tratadas de forma estritamente confidencial.

Por favor, marca a tua resposta a cada questão fazendo um "X" na caixa. Se tiveres uma dúvida, por favor levanta o braço e o responsável pelo inquérito irá ajudar-te.

Agradecemos desde já a tua participação!

Aceito participar no estudo.

Podes começar...

Escola:
 Ano:
 Turma:

A. Na caixa abaixo, escreve o código que aparece à frente do teu nome

Os teus colegas de turma e os teus melhores amigos

B. Com quais dos teus colegas do 10 e 11º ano preferes trabalhar ou pedir ajuda, por exemplo nos trabalhos de casa ou nos exercícios?

Localiza o nome dos colegas que preferes na lista (num máximo de 5) e escreve o seu código abaixo.

Código	Tu e ele(a) tornaram-se mais próximos desde Setembro?
	(Se a resposta for sim, assinala a caixa abaixo)
1 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>
2 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>
3 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>
4 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>
5 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>

C. Quem são os teus melhores amigos nos 10 e 11º ano?

Localiza o nome dos colegas que preferes na lista (num máximo de 5) e escreve o seu código abaixo. Os rapazes podem incluir raparigas que sejam amigas ou namoradas; as raparigas podem incluir rapazes que sejam amigos ou namorados.

Código	No último mês encontraste com ele(a) depois da escola para estarem juntos ou irem dar uma volta, incluindo no fim-de-semana?	Nos últimos sete dias, falaste com ele(a) ao telefone, no Facebook, Google Talk, Skype, etc. ou enviaste-lhe um SMS ou e-mail?	Tu e ele(a) tornaram-se mais próximos desde Setembro?
	Se a resposta for sim, assinala a caixa:	Se a resposta for sim, assinala a caixa:	Se a resposta for sim, assinala a caixa:
1 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sobre ti

As perguntas que se seguem são para ter alguma informação sobre ti.

1. Que idade tens atualmente?

- 12 anos 14 anos 16 anos 18 anos
 13 anos 15 anos 17 anos 19 anos ou mais

2. És...

- Rapariga Rapaz

3. Em que país nasceste?

- Em Portugal

Noutro país: _____

Passa à pergunta 5

Passa à pergunta 4

4. Se nasceste noutro país, em que ano te mudaste para Portugal?

Ano:

Saúde e estilo de vida

As perguntas que se seguem são sobre a tua saúde e as coisas que fazes.

5. Dirias que a tua saúde é...?

- Excelente
 Boa
 Razoável
 Má

6. Tens alguma doença prolongada, alguma incapacidade ou condição médica (como diabetes, artrite, alergias ou paralisia cerebral) que tenha sido diagnosticada por um médico?

- Sim
 Não

7. Nos últimos 7 dias, como costumaste ir e voltar da escola?

(Selecciona todas as opções que se aplicam)

- A pé, de bicicleta ou skate
 Autocarro escolar
 Carro
 Transporte público

8. Em média, quantas horas e minutos de atividade física intensa praticaste em cada dia da semana?

Isto inclui atividade física durante as aulas de educação física, durante a hora do almoço, a seguir às aulas ou nos tempos livres. Atividade física intensa é corrida, ciclismo, desporto em equipa, danças rápidas ou quaisquer outras atividades físicas que aumentem o teu batimento cardíaco e te façam respirar rápido ou suar.

Por exemplo: se fizeste 30 minutos de atividade física intensa na Segunda-feira, tens de assinalar a caixa 30 minutos, como indicado abaixo:

	Nenhuma	30 minutos	1 hora	1 hora e meia	2 horas	2 horas e meia	3 ou mais horas
Segunda-feira	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Nenhuma	30 minutos	1 hora	1 hora e meia	2 horas	2 horas e meia	3 ou mais horas
Segunda-feira	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Terça-feira	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quarta-feira	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quinta-feira	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sexta-feira	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sábado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Domingo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Nos últimos 12 meses, quantas vezes bebeste álcool (mais do que apenas um gole)?

Por "beber álcool" entendemos: 1 garrafa, lata ou copo de cerveja; 1 copo de vinho; 1 shot de bebida branca (gin, vodka, whisky, etc) ou uma bebida de mistura (1 shot de bebida branca com sumo, bebidas energéticas, etc.).

- Não bebi álcool nos últimos 12 meses
- Só bebi um gole
- Menos do que uma vez por mês
- Uma vez por mês
- 2 a 3 vezes por mês
- Uma vez por semana
- 2 vezes ou mais por semana

10. Que idade tinhas quando bebeste pela primeira vez mais do que um gole de álcool?

- Eu nunca bebi álcool
- Passa à pergunta 12**
- 9 anos ou menos
 - 10 anos
 - 11 anos
 - 12 anos
 - 13 anos
 - 14 anos
 - 15 anos
 - 16 anos
 - 17 anos
 - 18 anos ou mais

11. Nos últimos 12 meses, quantas vezes bebeste 5 ou mais bebidas alcoólicas na mesma ocasião?

- Não bebi 5 ou mais bebidas na mesma ocasião nos últimos 12 meses
- Menos de uma vez por mês
- Uma vez por mês
- 2 ou 3 vezes por mês
- Uma vez por semana
- 2 vezes ou mais por semana

12. Pensando nos últimos 12 meses, com que frequência usaste marijuana ou canábis? (charro, ganza, erva, haxixe...)

- Nunca usei marijuana ou canábis
- Já usei marijuana ou canábis mas não nos últimos 12 meses
- Menos de uma vez por mês
- Uma vez por mês
- 2 ou 3 vezes por mês
- Uma vez por semana
- 2 vezes ou mais por semana

A Tua Experiência com o Tabaco

As perguntas que se seguem são sobre o consumo de tabaco (cigarros, charutos, cigarrilhas e cigarros "slim"). Hoje fala-se muito sobre o consumo de tabaco mas há pouca informação correta. Por isso, ainda temos muito a aprender sobre as experiências reais e atitudes das pessoas da tua idade.

13. Já experimentaste fumar cigarros, ainda que só umas passas?

- Não
 - Sim
- Passa à pergunta 28**

14. Que idade tinhas quando experimentaste fumar cigarros pela primeira vez, ainda que só umas passas?

- 9 anos ou menos
- 10 anos
- 11 anos
- 12 anos
- 13 anos
- 14 anos
- 15 anos
- 16 anos
- 17 anos
- 18 anos ou mais

15. Quantos cigarros fumaste ao todo, até agora?

- Apenas um
- Entre 2 e 50
- Entre 50 e 100
- Mais de 100

16. Quantos cigarros fumaste nos últimos 30 dias?

- Nenhum
- 1 a 2 cigarros durante os últimos 30 dias
- 1 a 2 cigarros por semana
- 1 a 5 cigarros por dia
- 6 a 10 cigarros por dia (cerca de meio maço)
- 11 a 20 cigarros por dia (cerca de 1 maço)
- 21 a 30 cigarros por dia
- Mais de 30 cigarros por dia

17. Alguma vez tentaste deixar de fumar cigarros?

- Só fumei algumas vezes
- Nunca tentei deixar
- Tentei deixar pelo menos uma vez
- Já deixei de fumar

Passa à pergunta 23

Passa à pergunta 28

18. Quando estás num local onde é proibido fumar, é difícil para ti não fumares?

- Muito difícil
- Difícil
- Algo difícil
- Pouco difícil
- Não é difícil

19. Fumas mais de manhã do que durante o resto do dia?

- Sempre
- Habitualmente
- Às vezes
- Raramente
- Nunca

20. Fumas mesmo quando estás muito doente (por ex. com tosse ou a vomitar muito)?

- Sempre
- Habitualmente
- Às vezes
- Raramente
- Nunca

21. Até onde inalas o fumo?

- Apenas na boca
- Até à garganta
- Parcialmente no peito
- Até ao fundo do peito

22. Fumas o teu primeiro cigarro quanto tempo depois de acordares de manhã?

- Quando acabas de abrir os olhos
- Nos primeiros 15 minutos depois de acordar
- Entre 15 e 30 minutos depois de acordar
- Entre 30 e 60 minutos depois de acordar
- Entre 1 e 2 horas depois de acordar
- Mais de 2 horas depois de acordar

23. Onde costumavas fumar cigarros normalmente?

- Em casa
- Nas redondezas da escola
- Mesmo à porta da escola
- No local de trabalho
- Em casa de amigos
- Num café, bar, discoteca ou centro comercial
- Noutros locais públicos (por ex. parques, esquinas)

24. Com que frequência fumas cigarros sozinho?

- Nunca
- Às vezes
- Frequentemente
- Sempre

25. Nos últimos 30 dias (um mês), como arranjaste habitualmente os teus cigarros?

Marca todas as que se aplicam

- Não fumei cigarros nos últimos 30 dias (um mês)
- Comprei-os numa loja ou num vendedor de rua
- Comprei-os numa máquina
- Os meus pais ou irmãos deram-me
- Os meus amigos deram-me
- Arranjei-os de outra forma

26. O que pensam os teus amigos mais próximos acerca de tu fumares cigarros?

- São a favor
- São contra mas continuam a ser teus amigos
- São contra e deixaram de ser teus amigos
- Não se importam

27. O que achas que os teus pais sentem acerca de tu fumares cigarros, ou o que sentiriam se descobrissem que fumas?

- Não ficam ou não iriam ficar nada chateados
- Ficam ou ficariam um pouco chateados
- Ficam ou ficariam chateados
- Ficam ou ficariam muito chateados

Passa à pergunta 32

As questões 28, 29, 30 e 31 devem ser respondidas por pessoas que nunca experimentaram fumar um cigarro ou por pessoas que deixaram de fumar.

28. Achas que vais fumar um cigarro brevemente?

- De certeza que não
- Provavelmente não
- Provavelmente sim
- De certeza que sim

29. Qual seria a dificuldade para ti em arranjar cigarros se o quisesses?

- Muito difícil
- Relativamente difícil
- Relativamente fácil
- Muito fácil

30. O que é que os teus amigos mais próximos iriam pensar de ti se começassem a fumar cigarros?

- Seriam a favor
- Seriam contra mas continuariam teus amigos
- Seriam contra e deixariam de ser teus amigos
- Não se iriam importar

31. O que é que os teus pais iriam pensar de ti se começassem a fumar cigarros?

- Não iriam ficar nada chateados
- Ficariam um pouco chateados
- Ficariam chateados
- Ficariam muito chateados

32. Se um dos teus amigos te oferecesse um cigarro, fumavas?

- De certeza que não
- Provavelmente não
- Provavelmente sim
- De certeza que sim

33. Algum dos teus melhores e mais próximos amigos fuma cigarros?

- Nenhum deles
- Alguns deles
- A maior parte deles
- Todos

A Tua Família

34. Em que país nasceu a tua Mãe?

- Em Portugal
- Noutro país: _____

35. Em que país nasceu o teu Pai?

- Em Portugal
- Noutro país: _____

36. Qual o maior nível de escolaridade do teu pai?

- Terminou a escola primária ou nível inferior
- Escola secundária incompleta
- Completou a escola secundária
- Ensino universitário incompleto
- Completou o ensino universitário
- Não sei

37. Qual o maior nível de escolaridade da tua mãe?

- Terminou a escola primária ou nível inferior
- Escola secundária incompleta
- Completou a escola secundária
- Ensino universitário incompleto
- Completou o ensino universitário
- Não sei

As perguntas que se seguem são sobre o trabalho dos teus pais. "Trabalho" quer dizer qualquer atividade paga (quer seja pagamento em dinheiro, ou em bens e serviços em vez de dinheiro) ou lucro na última semana, mesmo que apenas durante uma hora.

38. O teu Pai trabalhou na semana passada?

- Não
- Sim
- Não sei ou não se aplica

Passa à pergunta 40

39. Se **NÃO** trabalhou, por favor assinala a caixa que melhor descreve a situação:

- Estava incapaz de trabalhar
- Estava de férias
- Estava reformado, a estudar ou em licença parental
- Estava desempregado há menos de um ano
- Estava desempregado há um ano ou mais
- Tomava conta de outras pessoas ou estava em casa a tempo inteiro
- Não sei

40. A tua Mãe trabalhou na semana passada?

- Não
- Sim
- Não sei ou não se aplica

Passa à pergunta 42

41. Se **NÃO** trabalhou, por favor assinala a caixa que melhor descreve a situação:

- Estava incapaz de trabalhar
- Estava de férias
- Estava reformado, a estudar ou em licença parental
- Estava desempregado há menos de um ano
- Estava desempregado há um ano ou mais
- Tomava conta de outras pessoas ou estava em casa a tempo inteiro
- Não sei

A tua família e a tua casa

Todas as famílias são diferentes (por exemplo, nem toda a gente vive com ambos os pais, às vezes vivem com apenas um, têm dois lares e vivem com duas famílias) e gostaríamos de conhecer a tua. Por favor, responde às seguintes questões sobre a casa onde vives **toda ou a maior parte do tempo**.

42. Quais das seguintes pessoas moram na casa onde vives todo ou a maior parte do tempo?

Assinala todas as situações que se aplicam

- Pai
- Padrasto
- Mãe
- Madrasta
- Irmão(s) / filho(s) do teu padrasto ou madrasta
- Irmã(s) / filha(s) do teu padrasto ou madrasta
- Avó(s)
- Outro(s) familiar(es)
- Outros não familiar(es)
- Vivo sozinho
- Vivo num colégio interno

43. Que línguas costumam **falar com mais frequência** em tua casa?

- Português
- Outras línguas: _____

As questões seguintes são sobre a tua casa (a casa/andar/apartamento onde passas a maior parte do tempo). Se vives em mais de uma casa (por exemplo, passas uma semana em casa da tua Mãe e a semana seguinte com o teu Pai ou noutro sítio) RESPONDE APENAS para o local onde vives **toda ou a maior parte do tempo**.

44. A tua família possui um carro, carrinha ou camioneta?

- Não
- Sim
- Sim, dois ou mais

45. Tens o teu próprio quarto?

- Não
 Sim

46. Quantos computadores /portáteis /tablets tem a tua família?

- Nenhum
 Um
 Dois
 Mais de dois

47. Quais das seguintes situações se aplicam à tua casa?

Assinala uma caixa em cada linha

	Sim	Não	Não sei
A minha casa tem infiltrações no teto, humidade nas paredes /no chão /nas fundações, ou chão /janelas apodrecidos.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A minha casa é adequadamente quente	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A minha casa é demasiado escura	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A minha casa tem falta de espaço	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

48. A minha família tem possibilidade:

Assinala uma caixa em cada linha

	Sim	Não	Não sei
De fazer face a despesas não esperadas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
De ter internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
De evitar pagamentos em atraso (por exemplo no crédito ou aluguer da casa, nas contas de água ou gás, no reembolso de empréstimos)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

49. Nos últimos 12 meses, quantas vezes viajaste de férias com a tua família?

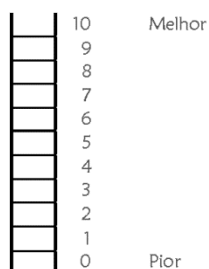
- Nunca
 Uma vez
 Duas vezes
 Mais de duas vezes

50. A casa/andar/apartamento onde vives pertence à tua família?

- Sim
 Não

51. Imagina que esta escada representa a sociedade portuguesa. No topo da escada estão as pessoas que estão melhor – que têm mais dinheiro, maior escolaridade e trabalhos mais reconhecidos socialmente. No fundo estão as pessoas que estão pior – que têm um nível de educação baixo, que estão sem trabalho ou têm trabalhos que lhes dão pouco dinheiro. Agora pensa na tua família. Por favor, diz-nos onde é que a tua família se iria localizar nesta escada.

(Assinala o quadrado que melhor representa onde a tua família se localiza na escada)



52. Aproximadamente, quanto dinheiro costumavas receber por semana para gastares ou poupar (semanadas), e em trabalhos como *babysitting*, lavar carros, etc?

- Zero
- Menos de € 5
- € 6 a € 10
- € 11 a € 20
- € 21 a € 50
- € 51 a € 100
- Mais de € 100

Regras sobre fumar em tua casa

As questões seguintes são sobre as regras relativas ao consumo de tabaco em tua casa ("casa" significa onde vives todo ou a maior parte do tempo).

53. Algum dos membros do teu núcleo familiar fuma cigarros?

Assinala todas as situações que se aplicam, selecciona uma caixa por linha

	Sím	Não	Não se aplica
Pai	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Padrasto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mãe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Madrasta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irmão(s) / filho(s) do teu padrasto ou madrasta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Irmã(s) / filha(s) do teu padrasto ou madrasta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avó(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outro(s) familiar(es)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outros não familiar(es)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

54. É permitido fumar em tua casa?

- Ninguém pode fumar em minha casa
- É permitido fumar em algumas partes de minha casa
- É permitido fumar à vontade em minha casa
- Não sei dizer

A Tua Escola e Tu

As perguntas seguintes são sobre a tua escola e para termos mais informações sobre ti.

55. Quando é que começaste a estudar nesta escola?

- No ano letivo passado
- Este ano letivo
- Há dois anos letivos
- Há mais de dois anos letivos

56. Qual das seguintes classificações melhor descreve as tuas notas no passado ano?

Assinala as classificações da primeira coluna se estavas no 3º ciclo, assinala as classificações da segunda coluna se estavas no ensino secundário

- Nível 5
- Nível 4
- Nível 3
- Nível 2
- Nível 1
- 19-20 valores
- 17-18 valores
- 14-16 valores
- 10-13 valores
- <10 valores

57. Por favor, escolhe a alternativa que melhor descreve a tua situação:

Assinala uma caixa por cada linha

	Nunca	Algumas vezes por ano	Uma vez por mês	Algumas vezes por mês	Algumas vezes por semana	Todos os dias
O tempo voa quando estou a estudar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto-me forte e saudável quando estou a estudar.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto-me entusiasmado com os meus estudos.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

58. Por favor, escolhe a alternativa que melhor descreve a tua situação:

Assinala uma caixa por cada linha

	Discordo totalmente	Discordo	Discordo em parte	Concordo em parte	Concordo	Concordo totalmente
Tenho um sentimento de inadaptação face ao trabalho escolar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto que estou a perder o interesse no trabalho escolar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dedico muito tempo às questões relativas ao trabalho escolar durante o meu tempo livre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

59. Com que intensidade concordas ou discordas das afirmações seguintes?

Assinala uma caixa por cada linha

	Discordo totalmente	Discordo	Concordo em parte	Concordo	Concordo totalmente
Sinto-me próximo das pessoas da minha escola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto que faço parte da minha escola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto-me feliz por estar na minha escola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto que os professores da minha escola me tratam de forma justa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sinto-me seguro na minha escola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

60. Com que frequência vês alunos a fumar nas redondezas da escola?

- Nunca
- Às vezes
- Frequentemente
- Sempre

61. Com que frequência vês professores a fumar?

- Nunca
- Às vezes
- Frequentemente
- Sempre

62. Na tua opinião, quantas pessoas da tua idade na tua escola fumam cigarros?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

63. Existem regras em relação ao tabaco na tua escola?

- Não existem regras
- Existem, mas não são aplicadas
- Existem, e às vezes são aplicadas
- Existem e são aplicadas

64. Achas que fumar cigarros é mau para a tua saúde?

- De certeza que não
- Provavelmente não
- Provavelmente sim
- De certeza que sim

65. Achas que o fumo dos cigarros das outras pessoas é mau para a tua saúde?

- De certeza que não
- Provavelmente não
- Provavelmente sim
- De certeza que sim


66. Quando for adulto:

(Assinala uma caixa por cada linha)

	Não acredito de todo	Não acredito	Acredito	Acredito totalmente
Terei boa saúde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Terei uma vida longa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Terei uma dieta saudável	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participarei em desportos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Muito obrigado pela tua colaboração!

9.3 APPENDIX 3 – SCHOOL QUESTIONNAIRE

 <p style="text-align: center; font-size: 1.2em;">Questionário escolar</p>	<p style="text-align: center; font-weight: bold;">PORTUGAL - Coimbra</p> <p>Escola: <input style="width: 150px;" type="text"/></p>
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Características da escola

As questões seguintes são sobre as características gerais da sua escola.

1. Qual é o número total de alunos do ensino secundário na escola?
 Número de rapazes:
 Número de raparigas:

2. Qual a percentagem aproximada de alunos do secundário na sua escola que não falam o Português como primeira língua? Percentagem:

3. Qual é o número total de professores do ensino secundário na escola?
 Número de professores:
 Número de auxiliares de educação:

4. Quantas turmas de cada ano existem na escola? Número:
 Quantos alunos existem por turma na escola? Número:


5. Quais destes espaços, na área da sua escola ou no bairro da escola (até 2 km), são frequentados pelos alunos da sua escola secundária? (Assinale todas as opções que se aplicam)

	Sim, dentro da escola	Sim, no bairro da escola	Não, não é usado
Ginásio, pavilhão desportivo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Piscinas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Campo de futebol, ténis ou outros desportos /pista de atletismo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pátio /recreio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Espaços verdes /parques /reservas naturais	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Quão favorecida é a zona onde a escola se localiza?
 - Nada favorecida
 - Não muito favorecida
 - Na média
 - Sensivelmente favorecida
 - Muito favorecida

7. Quão favorecidos são os alunos/suas famílias quando comparadas com outras famílias da cidade?
 - MUITÍSSIMO mais favorecidos
 - Muito mais favorecidos
 - Favorecidos
 - Igualmente favorecidos
 - Menos favorecidos
 - Muito menos favorecidos
 - MUITÍSSIMO menos favorecidos

9.4 APPENDIX 4 – TEACHER QUESTIONNAIRE

 Questionário escolar	PORTUGAL - Coimbra
	Escola: <input style="width: 150px;" type="text"/>

O espaço da escola

As questões abaixo são sobre o espaço físico da escola, tal como as suas instalações e equipamento, manutenção dos edifícios e qualidade do ar no interior.

1. Até que ponto concorda com as seguintes afirmações sobre a escola?
Assinale todas as que se aplicam, escolha apenas uma caixa por cada linha

	Discordo totalmente	Discordo	Concordo	Concordo totalmente	Não há na nossa escola
A escola está a precisar de grandes obras.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
O campo de jogos/ginásio/pavilhão gimnodesportivo estão em boas condições.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As salas de aula especializadas (por ex. laboratórios, oficinas, etc.) estão bem equipadas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
As casas de banho e instalações sanitárias estão em boas condições.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Existe equipamento multimédia (computadores e softwares, leitores de DVD, projectores, etc.) em número suficiente para os professores.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A temperatura na sala de aula é adequada ao longo do ano.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A exposição ao ruído nesta escola é reduzida.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A qualidade do ar nas salas de aulas é boa.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Quão problemáticos são os seguintes factores no bairro onde fica a escola?
Assinale tudo o que se aplica, escolha apenas uma caixa por linha

	Problema grave	Problema moderado	Problema menor	Não é problema
Lixo ou vidro partido nas ruas ou estradas, passeios e espaços verdes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Venda ou consumo de drogas ou consumo excessivo de álcool em público	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Violência ou vandalismo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Muito trânsito	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outros	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. É possível comprar cigarros ou tabaco nos 100 metros à volta da escola?
 Não
 Sim

4. Como avalia a atmosfera/ambiente social na sua escola?
 Muito bom
 Bom
 Razoavelmente bom
 Razoavelmente mau
 Mau
 Muito mau

Tabagismo

As questões seguintes são sobre a política da sua escola em relação ao consumo de tabaco por alunos, funcionários e visitantes. Por funcionários entendemos os directores da escola, professores, secretários, funcionários da cantina e outros. Por visitantes entendemos outros que não alunos e funcionários, incluindo membros da comunidade ou técnicos de manutenção. Estas pessoas podem visitar a escola dentro ou fora do horário das aulas.

5. A escola já adoptou uma política que proíba o consumo de tabaco?

- Não
 Sim

Passa à questão 9

6. Essa política proíbe o uso de tabaco especificamente nos seguintes horários para cada um dos seguintes grupos?

	Alunos		Funcionários		Visitantes	
	Sim	Não	Sim	Não	Sim	Não

Durante o período de aulas

Fora do período de aulas

7. Essa política proíbe especificamente o consumo de tabaco em cada um dos seguintes locais para cada um dos seguintes grupos?

	Alunos		Funcionários		Visitantes	
	Sim	Não	Sim	Não	Sim	Não

Nos edifícios da escola?

No espaço da escola, incluindo estacionamento e recreio?

Em autocarros escolares ou outros veículos de transporte de estudantes?

Fora da escola, em eventos patrocinados pela mesma?

8. Há quanto tempo estão em vigor as políticas da escola em relação ao consumo de tabaco?

- 5 ou mais anos
 3 a 4 anos
 1 a 2 anos
 Menos de 1 ano

9. A publicidade ao tabaco é proibida...

	Sim	Não
--	-----	-----

No edifício da escola?

No espaço da escola, incluindo fora dos edifícios ou nos recreios?

Em autocarros escolares ou outros transportes usados para transportar alunos?

Nas publicações da escola?

Em relação ao patrocínio de eventos escolares?

10. A escola tem um espaço/zona de fumadores (por ex. uma sala ou uma área) para:

	Sim	Não
--	-----	-----

Alunos

Funcionários

Visitantes

11. Desde Setembro, viu algum aluno a quebrar as regras relativas ao tabaco?

- Não
 Sim

12. A sua escola tem meios para informar todos os alunos...

	Sim	Não
--	-----	-----

Acerca das regras relativas ao consumo de tabaco por alunos?

Acerca do que acontece quando quebras as regras?

13. Qual dos seguintes métodos é usado pela escola para comunicar as suas regras sobre tabaco aos alunos?

	Sím	Não
Por escrito na caderneta do aluno	<input type="checkbox"/>	<input type="checkbox"/>
Por escrito no manual escolar	<input type="checkbox"/>	<input type="checkbox"/>
Por escrito na newsletter da escola	<input type="checkbox"/>	<input type="checkbox"/>
Verbalmente, em discussões com os alunos (por ex. assembleias, conselhos de escola)	<input type="checkbox"/>	<input type="checkbox"/>
Publicando-as no(s) website(s) da escola	<input type="checkbox"/>	<input type="checkbox"/>
Afixando-as na escola	<input type="checkbox"/>	<input type="checkbox"/>
E-mail	<input type="checkbox"/>	<input type="checkbox"/>

14. Desde Setembro, quantos alunos quebraram a regra da escola em relação ao tabaco?

- Nenhum
- Poucos
- Alguns
- A maioria
- Todos

15. Quais foram as consequências para os alunos apanhados a violar as regras em relação ao tabaco na tua escola, desde Setembro?

- Foi-lhes dado um aviso (escrito ou verbal)
- Foram informados os pais
- Foram levados ao diretor da escola
- Foram levados ao diretor de turma
- Foram encorajados, mas não forçados, a participar em programas de ajuda, educação e de cessação tabágica
- Foram forçados a participar em programas de ajuda, educação e de cessação tabágica
- Foi-lhes confiscado o tabaco
- Receberam trabalhos extra (escritos/apresentações)
- Foram forçados a desempenhar tarefas na escola
- Multa
- Castigo
- Suspensão
- Expulsão

16. A escola tem procedimentos para informar as famílias dos alunos....

	Sím	Não
Acerca das regras sobre o consumo de tabaco por alunos?	<input type="checkbox"/>	<input type="checkbox"/>
Sobre o que acontece se quebrarem essas regras?	<input type="checkbox"/>	<input type="checkbox"/>

17. A escola tem procedimentos para informar os funcionários...

	Sím	Não
Acerca das regras sobre o consumo de tabaco por funcionários?	<input type="checkbox"/>	<input type="checkbox"/>
Sobre o que acontece se quebrarem essas regras?	<input type="checkbox"/>	<input type="checkbox"/>

18. A escola tem procedimentos para informar os visitantes...

	Sím	Não
Acerca das regras sobre o consumo de tabaco por visitantes?	<input type="checkbox"/>	<input type="checkbox"/>
Sobre o que acontece se quebrarem essas regras?	<input type="checkbox"/>	<input type="checkbox"/>

Promoção e Prevenção da Saúde na sua Escola

As questões seguintes são sobre iniciativas de prevenção e promoção da saúde na sua escola.

19. Na sua escola existem horas que os professores dediquem especificamente a desencorajar o consumo de tabaco?

- Sim
 Não

Passe à questão 21

20. Para quais destes anos é que a escola fornece esclarecimentos sobre o consumo de tabaco (por ex. actividades educacionais)?

Assinale todas as que se aplicam, selecione apenas uma caixa por linha

	Sím, é obrigatório	Sím, é oferecido	Não	Não sabe
1º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12º ano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. Como se enquadra o programa educacional contra o tabaco da escola no currículo educativo?

- É ensinado em separado
 É parte do programa de saúde escolar
 É ensinado dentro do contexto de outras áreas disciplinares (por ex. no contexto de cursos de biologia, religião/ética, educação sexual, se aplicável)

As questões seguintes referem-se a programas de cessação tabágica oferecidos na escola.

22. A escola oferece programas de ajuda à cessação tabágica (por ex. sessões de grupo, materiais de auto-ajuda, aconselhamento individual feito por enfermeiros)?

- Sim
 Não

23. Desde Setembro, a escola trabalhou com autoridades regionais de saúde, centros de saúde, unidades de saúde pública ou peritos externos (por ex. psicólogos, assistentes sociais) para desenvolver ou implementar actividades destinadas a desencorajar o consumo de tabaco ou ajudar as pessoas a deixar de fumar?

	Sím	Não
Ações de prevenção	<input type="checkbox"/>	<input type="checkbox"/>
Deixar de fumar	<input type="checkbox"/>	<input type="checkbox"/>

A próxima pergunta é sobre os procedimentos que a escola usa para envolver os estudantes, as famílias e os membros da comunidade nos seus esforços para desencorajar o consumo de tabaco.

24. Neste ano lectivo...

	Sim	Não
Os estudantes ajudaram a desenvolver, divulgar ou implementar políticas ou actividades com o intuito de desencorajar o consumo de tabaco?	<input type="checkbox"/>	<input type="checkbox"/>
As famílias dos estudantes ajudaram a desenvolver, divulgar ou implementar políticas ou actividades com o intuito de desencorajar o consumo de tabaco?	<input type="checkbox"/>	<input type="checkbox"/>
Os membros da comunidade ajudaram a desenvolver, divulgar ou implementar políticas ou actividades com o intuito de desencorajar o consumo de tabaco?	<input type="checkbox"/>	<input type="checkbox"/>

25. Nos últimos cinco anos, que formação sobre prevenção de consumo de tabaco recebeu?

- Nenhuma
- Mais de um dia inteiro de formação, durante o serviço
- Um dia inteiro de formação, durante o serviço
- Menos de um dia de formação, durante o serviço
- Não me recordo

26. Quão fortemente concorda ou discorda com cada uma das seguintes afirmações?

	Discordo totalmente	Discordo	Concordo	Concordo totalmente
A escola tem um coordenador e/ou comité para planear, implementar e coordenar actividades relacionadas com saúde e bem-estar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
O horário escolar é atribuído a (alguns) funcionários para planear, implementar e coordenar actividades de promoção de saúde	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A saúde e bem-estar são parte do plano estratégico ou de desenvolvimento da escola	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sobre si

As questões seguintes são sobre si.

27. Que idade tem?

Anos:

28. Qual é o seu sexo?

- Feminino
- Masculino

29. Qual é a sua posição na escola?

- Director
- Vice-director, assistente de director
- Professor
- Professor de saúde

Outro: _____

30. Há quanto tempo trabalha nesta escola?

Anos:

31. Fuma cigarros diariamente, ocasionalmente ou não fuma?

- Diariamente
- Ocasionalmente
- Nunca

Muito obrigado pela sua colaboração!