Smoking inequalities and tobacco control policies in Europe
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CHAPTER 12

General discussion
This thesis aimed at assessing inequalities in smoking in Europe according to socioeconomic status (SES) and the effects of tobacco control policies on smoking and smoking inequalities. More specifically the thesis aimed 1) to quantify socioeconomic inequalities in smoking and assess a selection of mechanisms through which socioeconomic status may affect smoking initiation and 2) to evaluate tobacco control policies with regards to their impact on socioeconomic inequalities in smoking.

This chapter provides a discussion of the key findings from the studies in this thesis. We discuss the origins of socioeconomic inequalities in smoking initiation and from this we try to understand the equity impact of tobacco control policies. The implications of these findings for future policies and research are considered. Finally, overall conclusions are drawn. Limitations of the methods are discussed in the chapters of individual studies and will not be discussed in this chapter.

BACKGROUND AND OUTLINE

Smoking uptake typically takes place in adolescence\(^1\), and this is also the period in life in which socioeconomic inequalities in smoking emerge\(^2,3\). Previous studies and Part I of this thesis demonstrated that adolescents of lower SES, and especially those adolescents who underperform in school, are more likely to take up smoking\(^2,4,6\). As adults, smokers of lower SES are less likely to successfully quit smoking\(^7\) and as a result socioeconomic inequalities in smoking persist or even increase in adulthood\(^8\), thereby causing an important part of inequalities in premature mortality\(^9,10\). Preventing adolescent smoking inequalities is therefore an important step in preventing inequalities in mortality.

Tobacco control policies have generally been found to reduce smoking prevalence rates among young people\(^11,12\). In Part II of this thesis we further contribute evidence supporting this claim. We found that policy packages were associated with decreasing smoking rates. Specific tobacco control policies aimed tobacco control in schools and limiting youth access to tobacco had a potential indirect effect through reducing smoking behaviour on school premises and decreasing the perceived obtainability of tobacco. The point of sale tobacco display ban introduced in England was found to gradually decrease smoking rates in the general population.

In order to reduce smoking inequalities in young people, interventions and policies are needed that are highly effective, and that sort even larger effects in adolescents of lower SES than in their high SES counterparts. In the recent literature few studies have tested effects of policies and interventions on
inequalities in adolescent smoking. A comprehensive systematic review investigated the ‘equity impact’ of policies and interventions. Tax and price increases of tobacco products have some supportive evidence of being more effective in preventing smoking in young people of lower SES (‘equity positive’). However, other policies were mostly found to be either more effective in higher SES individuals (‘equity negative’) or about equally effective in both high and low SES (‘equity neutral’).

The findings from the policy evaluation studies in Part II of this thesis largely support this conclusion. Evaluations of comprehensive policy packages showed that tobacco control policies may have sorted larger effects in high SES than in low SES (chapters 7 and 8). However, studies of specific tobacco control policies indicated that school policies, tobacco display bans, and restricting tobacco access for minors equally affected high and low SES, or may even have favoured low SES groups (chapters 9, 10 and 11). Overall, tobacco control policies did not seem to decrease relative socioeconomic inequalities in smoking.

To date, we do not have a full understanding of why most tobacco control policies fail to have equity positive effects. Although studies have estimated the equity impact, very few provide explanations for the findings on equity impact. It is therefore uncertain why tobacco control policies do not achieve equity positive results and what needs to change in future tobacco control in order to achieve the goal of reducing inequalities in adolescent smoking.

In this chapter we take three steps towards clarifying how future policies may be more effective in reducing inequalities in adolescent smoking. First we build a comprehensive theoretical framework outlining the mechanisms causing adolescents of low SES to take up smoking more often. After providing an overview of such mechanisms, we analyse which mechanisms may have been affected by the policies that have been evaluated in Part II of this thesis and we try to explain how these policies may have resulted in equity positive, neutral or negative effects on smoking. This understanding of the equity impact of existing tobacco control policies serves as input to the last step, in which we infer how future policies might be successful at reducing smoking in low SES adolescents and decreasing inequalities in adolescent smoking. Based on this, we aim at providing implications for future equity oriented tobacco control policies as well as suggestions for research on socioeconomic inequalities in smoking are provided.
UNDERSTANDING INEQUALITIES IN SMOKING INITIATION

Previously defined factors underlying socioeconomic inequalities in smoking

Since the magnitude and the consistency of socioeconomic inequalities in smoking have been fairly well described, researchers have recently taken an interest in explaining how observed inequalities in smoking come into existence. Understanding smoking inequalities has been approached from a few different disciplines including public health, sociology, social psychology and economics. From these different perspectives emanate complementary elements of theories on smoking inequalities.

In order to establish the mechanisms through which smoking initiation in adolescents varies by SES, the definition of SES is important. SES is a broad concept, especially in adolescence. Adolescents are often considered to have a socioeconomic background determined by the SES of their parents. However, as adolescence is a period in which individuals grow towards adulthood and develop their own identity, adolescents are often considered to have their own SES as well. Own SES is often measured in terms of academic performance (school grades or perceived performance) or level of schooling (in many European countries defined in terms of educational tracks). In Chapter 2 of this thesis we demonstrated that inequalities in smoking are much more pronounced by the adolescent’s own SES than that of their parents. This was also found in previous research. In building our theoretical framework we therefore focus on the adolescent’s own educational performance. However, in exploring existing theories we take a broader approach in which we also take into account a wider range of SES indicators.

The influence of smoking peers is often referred to as an important factor causing adolescents to start smoking, due to imitation of smoking role models through social learning. It has also been suggested that the higher prevalence of smoking in low SES adolescents influences other low SES adolescents to initiate smoking and thus to cause inequalities in smoking. However, as was pointed out in previous reviews, peer smoking can only explain how existing inequalities in smoking may be reproduced, but not how they originated.

Peers and other people in the social environment may nonetheless play an important role. Social networks often have a high level of homogeneity: adolescents tend to have social networks with similar SES and smoking behaviour. Social support is associated with adolescent smoking, although peer support does not seem to play an important role in
inequalities in adolescent smoking\textsuperscript{25} and networks of high SES might have a stronger positive influence on each other’s smoking behaviour than low SES networks\textsuperscript{26}. Social network effects may also take place in the area of residence, in line with results found in Chapter 3\textsuperscript{27}. Social norms may also differ between groups\textsuperscript{16}. In Chapter 5 we studied perceived smoking prevalence among peers, i.e. the descriptive social norm. Adolescents with a poor academic performance perceived a higher peer smoking prevalence than their highly performing counterparts, independent of the actual smoking behaviour of the other adolescents in their school and that of their friends.

Influence of the parents may be considered separately from other social influences, as parents have been in adolescents’ lives throughout their lifespan. Parents may express a social norm toward smoking, in which parents of low SES adolescents may express a more accepting social norm\textsuperscript{28}. Parental support\textsuperscript{29} and some specific anti-smoking parenting strategies have been found to prevent smoking among adolescents\textsuperscript{30-34}. Children of supportive parents\textsuperscript{33}, who maintain a high quality of communication with their parents\textsuperscript{31,35}, and have a no-smoking agreement\textsuperscript{35} are less likely to smoke. Parental monitoring may also be important in achieving a good academic performance\textsuperscript{29,34}. However, evidence for the role of parenting practices in educational inequalities in smoking is scare and also mixed. Ringlever et al.\textsuperscript{36} found that parenting practices may differ by parental SES, and De Looze et al.\textsuperscript{37} found that differences in parenting practices may explain educational variation in a combination of risk behaviours\textsuperscript{37}. However, in Chapter 4 we did not find evidence for socioeconomic inequalities in a wide range of parenting practices, in a subpopulation of the Netherlands.

The extent to which adolescents feel connected to their school and enjoy school is associated with their academic performance\textsuperscript{38} as well as their health behaviour\textsuperscript{39}. Weaker school connectedness may promote smoking as skipping school provides more opportunity to smoke\textsuperscript{29}. Andersson and Maralani\textsuperscript{21} suggest that smoking inequalities are for a large part explained by smoking behaviour of friends and school connectedness.

Many studies emphasise the importance of future orientation\textsuperscript{20,22,28,40,41}. Low SES adolescents may perceive fewer benefits of health and longevity as they are less oriented toward the future. The health risks of smoking may therefore be less of a barrier for smoking initiation in low SES. Having experienced socioeconomic disadvantage early in life may contribute to having a heightened sense of hopelessness throughout the life-course, which may affect health behaviour\textsuperscript{20}. Moreover, not being oriented toward the future can affect academic performance, and may in turn be influenced by academic performance. Future orientation and motivation to not smoke
may be higher in well performing adolescents, because of their better career perspectives\textsuperscript{28}.

Smoking may be used as a coping mechanism to reduce stress, and stress levels may be higher in low SES inequalities in smoking\textsuperscript{16,20,22,29}. Poorly preforming adolescents may experience high levels of school induced stress which may increase the likelihood of smoking initiation in these adolescents\textsuperscript{20,22,29}. However, stress is not necessarily higher in low SES adolescents, and the association may be reverse as smoking can increase stress-levels\textsuperscript{20}. There is some evidence suggesting that although both levels of stress and smoking are higher in low SES adolescents, it does not contribute much to explaining adolescent smoking inequalities\textsuperscript{42}.

Poor academic performance may not only cause schoolwork related stress, but might also affect adolescents’ mental wellbeing and attitudes related to smoking\textsuperscript{22}. Due to their poor performance, adolescents’ lower self-value might lead to self-damaging behaviour\textsuperscript{22}. Engaging in dangerous behaviours is also suggested to be a way to rebel against authorities\textsuperscript{22}. Poorly performing adolescents may be more likely to reject authorities, because they may feel rejected and marginalised by them\textsuperscript{22}.

Pre-existing characteristics of individuals originating in childhood, or genetic predispositions, may influence academic performance as well as smoking behaviour. A lower level of cognitive ability among low SES individuals could explain smoking inequalities\textsuperscript{20}, especially due to the ability to understand the harms of smoking and to act on this knowledge\textsuperscript{20,28,40,41}. Furthermore, the level of self-directedness may be important\textsuperscript{20,29,40}. Low SES adolescents may be more fatalistic, believing that their efforts do not lead to longer and healthier lives and better school grades. Such individual characteristics are likely to have developed early in life and to have been reinforced by experiences of disadvantage during childhood\textsuperscript{20}. In Chapter 6 we assessed the contribution of these mechanisms and we found that cognitive ability might play a larger role than self-control in causing inequalities in smoking.

Inequalities in adolescent smoking may also be explained by class distinction\textsuperscript{20,22,28}. Poorly performing adolescent may not be able to academically distinct themselves, and may struggle to meet academic demands that they cannot meet\textsuperscript{20,22,28}. Low SES adolescents may therefore compensate to other social fields where they can get prestige for being cool, careless, and daring\textsuperscript{22}, and obtain an image of independence, toughness, and freedom from convention\textsuperscript{20}. In this process, cigarette smoking may be key attribute. Class distinctions might be reinforced by wanting to conform to one’s future SES class and future SES milieu\textsuperscript{22}.
Some authors emphasise the importance of a life-course perspective, in which there is recognition for the development in childhood\(^{21,28,29}\). Some of the mechanisms discussed above might explain how poor academic performance and smoking become intertwined across the early life course\(^{21}\). Conversely, positive childhood experiences may buffer against social and academic stressors in new school environments\(^{29}\). However, in a longitudinal life-course analysis, childhood measures seemed to have little influence on inequalities in smoking at age 16\(^{21}\). Thus, the origins of these inequalities are for an important part embedded in adolescence.

**Theoretical framework**

Based on the findings as summarised in the previous section, we developed a theoretical framework depicting how academic performance and smoking initiation are linked. Figure 12.1 presents the proposed theoretical framework.

In understanding the mechanisms of why poor performing adolescents are more likely to smoke, four scenarios are being considered: indirect selection effects, causal pathways and factors that provide the opportunity to smoke. Indirect selection effects comprise those factors that can cause low academic performance as well as smoking initiation. Causal pathways are set in motion by the school environment or educational curriculum that vary according to the academic performance and that may cause smoking initiation. Opportunity factors might determine whether the causal pathways are translated into smoking initiation.

*Indirect selection effects*

Behavioural and personality characteristics of adolescents are likely to influence academic performance as well as smoking initiation. This is sometimes described as indirect selection, of which factors are typically developed in childhood. Some scholars therefore suggest a life-course approach to smoking inequalities. Personal intrinsic characteristics that may influence academic performance and smoking initiation include cognitive ability and self-control. In theory, more intelligent adolescents not only perform well in school, but may also be inherently better able to understand the dangers of smoking. Similarly, adolescents who are better able to control their behaviour and are more able to successfully complete school assignments and are more likely to keep themselves from engaging in smoking. Personal characteristics that are likely to develop under the influence of childhood environments are mental wellbeing and time preferences. Time preferences indicate the preference for long-term or short-term gain. Mental wellbeing and time preferences may be a result
of experiences in primary school, upbringing by parents and influences of
the social (childhood) environment. Parenting styles and strategies applied
by parents as well as the level of support offered to the adolescent may
influence adolescents’ level of academic performance as well as their
smoking uptake.

Causal pathways

Causal pathways assume that the academic performance has an impact
on the likelihood of initiating smoking, either through the contents of the
education itself or through the type of school adolescents are in because
of their educational track. In both ways, poor academic performance may
engender an individual response that can make adolescents susceptible to
smoking and might lead to smoking initiation.

The type of school might determine the school’s policies and social climate,
and the extent to which smoking is visible in the school environment.
School smoking policies, such as smoke-free school premises, may differ
between types of schools and affect smoking through three mechanisms.
First, school policies express a negative norm toward smoking, by making
an official statement against smoking, and by reducing the visibility of
smoking in the school environment. Second, school policies may reduce
the perceived opportunity of smoking by reducing places to smoke and by
reducing people to get cigarettes from. Third, school policies may provoke
rebelliousness, if adolescents feel the need to oppose authority. The
perceived norm and rebelliousness may also be influenced by the school’s
social climate and the visibility of smoking around the school. The visibility
of smoking might lead to increased accepting social norms. The social
climate may provoke or revoke feelings of rebelliousness and stress.

Poorly performing adolescents may feel marginalised or stigmatised
by school authorities, parents or society, for not doing well in school. Marginalisation may lead to higher levels of rebelliousness against non-
smoking norms of authorities (schools, parents, society), increased levels
of stress about the adolescents’ poor performance, reinforce feelings of
belonging to the lower class without a promising future. This all may lead to
smoking uptake as a class distinction. Also, the feeling of belonging to
the lower class and marginalisation can make poor performing adolescents
less oriented toward the future, and less concerned about their future
health.

Poorer performing students may benefit less from the positive effects of
education on cognitive development. Weaker development of cognitive
skills might lead to a poorer understanding of the dangers of smoking, and
less ability to cope with stress in other ways than resorting to substance abuse. Also, weaker cognitive skills provide less possibilities for future studies and careers and may therefore impair adolescents’ future orientation.

**Opportunity**

The mechanisms described above may all lead to a higher susceptibility in smoking in poorly performing adolescents than in their well performing counterparts. However, the likelihood of initiating smoking is conditional on the opportunity to actually obtain tobacco if sought for. If tobacco would much less easy to come by, adolescents would be less able to convert their individual responses to poor academic performance (e.g. high levels of stress, rebelliousness or lack of future orientation) into actual smoking initiation. The physical environment might make smoking initiation more difficult to the extent that tobacco is not available (to minors) through commercial or social sources and to the extent that adolescents do not have the financial resources to purchase tobacco.
Figure 12.1: Theoretical framework of the origins of socioeconomic inequalities in smoking initiation.
Limitations of this framework

We acknowledge that the presented framework is a simplification of reality. Some possible mechanisms were not depicted in Figure 12.1. First, not all individual responses are necessarily triggered by the school environment and education itself, but may simultaneously be triggered within other settings such as the home environment. For example, parental and sibling smoking behaviour can affect perceived social norms. However, such factors related to the home environment would not be in the causal pathway as they do not necessarily result from low academic performance.

Second, the opportunity to obtain tobacco may not be the only factor determining whether smoking susceptibility is converted into smoking initiation. For example, unaccepting social norms (e.g. from the home environment) and the availability of tobacco (e.g. from illicit sources) within other settings than the school environment may either buffer or reinforce causal effects stemming from the school environment.

Third, we have not depicted the possibility that the proposed mechanisms may not have an equally strong influence in various demographic groups such as age groups, boys and girls, and ethnic groups. Adolescents of over 15 years old may already have formed social norms and networks around smoking and may thus be more likely to initiate smoking as a response to stress or rebelliousness. School policies may be less likely to influence established norms, in older adolescents, than newly forming norms in younger adolescents.

Mechanisms may also differ between countries. National educational systems differ in the influence they might have on marginalisation of poorly performing adolescents. Highly differentiated educational tracks may construct an educational hierarchy, leading to different future opportunities. However, educational track school systems may have the advantage over comprehensive educational systems, that adolescents compare their academic efforts and results with adolescents from the same track. This leads to smaller perceived differences in academic performance, and smoking inequalities have been found to be smaller in countries with more differentiated educational systems.
UNDERSTANDING THE EQUITY IMPACT OF TOBACCO CONTROL POLICIES

In 2005 the Framework Convention on Tobacco Control (FCTC) came into force. The FCTC is a legally binding public health treaty with the aim to “protect present and future generations from the devastating health, social, environmental and economic consequences of tobacco consumption and exposure to tobacco smoke” \(^44\) by reducing the “prevalence of tobacco use and exposure to tobacco smoke” \(^44\). The FCTC proposes to reach this reduction through the use of various tobacco control measures, which are specified in the FCTC report \(^44\).

As the FCTC was initiated in 2003, some new policy initiatives have developed since. These developments are reflected in the Tobacco Control Scale (TCS), which measures the strength of national tobacco control policies in Europe. In 2005 \(^45\) the TCS contained less items than in 2013 \(^46\), due to the introduction of new policies in some countries. New policies relevant for adolescents included point of sale display ban, and restrictions to product presentation (standard form and size of packages, and plain packaging or larger (graphic) health warning labels). Additionally, England and Wales introduced a ban on smoking in cars with anyone under 18 years. These are extensions of Article 8 and Article 13 of the FCTC. Furthermore, school smoking policies are not mentioned by the FCTC or TCS, but have also been developed at the initiative of schools or local and national governments.

Tobacco control measures proposed by the FCTC, and recent extensions which are likely to affect adolescent smoking are summarised in Box 12.1. The FCTC policies were not developed from an equity perspective; reducing inequalities in smoking was not specified as an aim and thus no specific effort to reduce inequalities were undertaken \(^44\). However, the FCTC’s policies may have had consequences for smoking inequalities.
Box 12.1: Policies proposed by the FCTC which may affect adolescent smoking initiation.

<table>
<thead>
<tr>
<th>Tobacco control policy</th>
<th>Equity impact(^a) on adolescent smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price and tax policies</td>
<td>Positive</td>
</tr>
<tr>
<td>Protection from second hand smoke</td>
<td>Unknown</td>
</tr>
<tr>
<td>Packaging and labelling</td>
<td>Unknown</td>
</tr>
<tr>
<td>Public awareness</td>
<td>Unknown</td>
</tr>
<tr>
<td>Tobacco advertisement and promotion</td>
<td>Neutral or negative</td>
</tr>
<tr>
<td>Sales to and by minors</td>
<td>Neutral or positive</td>
</tr>
<tr>
<td>School policies and interventions</td>
<td>Neutral or positive</td>
</tr>
<tr>
<td>Policy packages</td>
<td>Neutral or negative</td>
</tr>
</tbody>
</table>

\(^a\) Equity positive: larger effect size in low SES than in high SES adolescents, equity neutral: equal effect size in low SE and high SES adolescents, equity negative: larger effect size in high SES than in low SES adolescents, unknown: no sufficient evidence to draw a conclusion on equity impact.

Equity impact of existing tobacco control policies

A 2015 literature review by Brown et al. provided an overview of the existing evidence on the equity impact of tobacco control policies on adolescent smoking\(^{13}\). They found that few studies (no more than 38) had assessed the equity impact on adolescent smoking. The proportions of equity positive, neutral and negative study results were respectively 18%, 40% and 30%. The remaining 12% showed mixed or unclear results.

Table 12.1 summarises the results of this review and of the studies in this thesis, according to the FCTC policies presented in Box 12.1 and for school policies and interventions and packages of multiple policies. For many policies the evidence is not consistent, or there is a lack of evidence to draw conclusions on equity impact.

Table 12.1: Summary of the equity impact of tobacco control policies on adolescent smoking behaviour.
Specific tobacco control policies

Price and tax policies are widely accepted as effective\(^{47}\) and low SES young people are generally believed to be highly responsive to price\(^{48}\). Increasing the tax or price of tobacco is the policy with the most convincing evidence of a equity positive impact on adolescent smoking\(^{13,49}\). Brown et al. identified seven studies reporting on the influence of price or tax increases on adolescent smoking. Four found equity positive results, and these studies were all from the US\(^{50-53}\). Studies from Ireland\(^{54}\) and France\(^{55}\), and one other US study\(^{56}\), did not find equity positive results. It is unclear whether results from the US are applicable to European settings.

Policies protecting adolescents from second hand smoke have hardly been with an equity perspective. A few studies have been conducted investigating the equity impact of national smoke-free policies on adolescent smoking behaviour\(^{13}\). UK studies on the equity impact on second hand smoking, parental smoking in cars and hospital admissions for childhood asthma, found equity neutral or equity negative effects (stronger effects in high SES adolescents)\(^{13}\). One study from the US, using adolescent smoking behaviour as the outcome, found that smoke-free policies had an equity negative effect\(^{50}\).

Policies on packaging and labelling have, to our knowledge, not previously been evaluated for their equity impact on adolescent smoking. Health warning labels have been found to have an effect on adolescent smoking behaviour\(^{57}\), and in adults, health warning labels have a neutral or equity negative effect on smoking\(^{58}\).

The equity impact of public awareness campaigns has not been well studied in adolescents. The review by Brown et al. identified only one study measuring the impact of a mass media campaign on inequalities in adolescents\(^{13}\). The study evaluated the ‘truth’ campaign, and measured awareness and receptivity as the outcomes\(^{59}\). Area level SES indicators showed mixed results, and there was no clear equity impact\(^{59}\). More studies evaluated the equity impact of media campaigns on adults; the observed equity impact appeared to be dependent on the contents of the message, the media format, and the mechanisms of engagement\(^{58}\).

Tobacco advertisement and promotion have been studied in four US studies, evaluating the equity impact of advertising, promotion and marketing controls on adolescent smoking\(^{13}\). These studies suggest that controls on advertisement, including cigarette pack designs, may have an equity neutral\(^{56,60}\) or negative impact\(^{61,62}\).
Legislation to restrict sales to minors have been found to have equity neutral\textsuperscript{63,64} or equity positive\textsuperscript{65,66} effects\textsuperscript{13}. The results of Chapter 11 were mostly in line with findings of previous studies. In Chapter 11 we found that after the introduction of a ban on tobacco sales to minors below the age of 18, tobacco became less easy to obtain, but smoking behaviour was not affected. These results did not vary by the educational level of the parents.

Studies on school based interventions found mixed results on smoking inequalities\textsuperscript{13}. ASSIST is a smoking prevention programme with a social network approach that was effective in preventing smoking uptake, especially in adolescents living in deprived areas\textsuperscript{67}. In Chapter 9 we studied the association between school smoking policies and adolescent smoking and smoking on the school premises\textsuperscript{68}. School policies were not associated with adolescent smoking in general, although stronger policies tended to be associated with less smoking on the school premises. This was found for all adolescents independently of their academic performance or the educational level of their parents. There was a tendency towards an equity positive impact.

**Comprehensive tobacco control policy packages**

It has been suggested that a package of policies may be more effective in reducing smoking rates than individual policies\textsuperscript{47}. According to Brown et al.\textsuperscript{13} three previous studies examined the equity impact of multiple policies. Results of these studies were mostly equity neutral. Two studies that investigated policy packages including smoking restriction policies, tobacco taxation and youth access policies and found an equity neutral effect\textsuperscript{69,70}. One study on the impact of a package of smoke-free, age-of-sale and health warnings policies found mixed results\textsuperscript{71}: a positive impact for males and a neutral impact for females.

Two chapters in this thesis studied the equity impact of policy packages. Chapter 7 was set in the Netherlands, and Chapter 8 in 13 European countries. In Chapter 7 we studied a policy package consisting of (i) a ban on sales to minors (below the age of 16 years), (ii) a ban on the sale of small packs (with fewer than 19 cigarettes), (iii) a full ban on advertisement and sponsoring and (iv) a ban on tobacco sales in government institutions\textsuperscript{72}. This policy package was found to have a marked equity negative impact, especially in males\textsuperscript{72}.

In Chapter 8\textsuperscript{73} we examined the impact of policy packages as summarised in the Tobacco Control Scale (TCS), which measures the presence and level of implementation of tobacco control policies at the country-level\textsuperscript{46}. With the inclusion of 13 European countries in three survey waves we covered
a wide range of policies. We found that higher TCS scores were associated with lower smoking rates. The association was consistently stronger in high SES than in low SES individuals, but the difference was not statistically significant. The TCS therefore tended to show an equity neutral or equity negative impact across Europe.

**Explaining the equity impact of existing tobacco control policies**

The preceding section showed that there is a variation in the extent to which effects of tobacco control policies differ by SES, but there seem to be very few policies achieving equity positive effects. This raises the question of what makes different tobacco control policies have different results on socioeconomic inequalities in adolescent smoking. Existing reviews on the equity impact of tobacco control policies provide surprisingly little explanation for the lack of equity positive impacts of tobacco control policies.

The ITC project on the impact of tobacco control policies on smoking in adults, developed a conceptual model on how policies influence smoking cessation in adults. Fong et al. propose that specific aspects of tobacco control policies influence psychosocial mediators that may lead to smoking cessation or to unintended outcomes including tax avoidance and justification of smoking behaviour. Similar to the conceptual model of Fong et al. we assume that tobacco control policies affect several of the variables in our theoretical framework presented in Figure 12.1. These mechanisms are discussed below.

A change in the perceived social norm is a mechanism that is plausible to work for most tobacco control policies. Most policies express in explicit or implicit ways that tobacco is a dangerous product of which the use needs to be controlled, and that smoking is an undesirable behaviour. This helps de-normalising smoking, through a change in social norm. A more unaccepting social norm is related to a lower rate of adolescent smoking. According to Figure 12.1, perceived norms are also influenced by factors closely related to the academic performance of the adolescent, through the school environment and the content of education. If the de-normalisation of smoking as a result of tobacco control policies were to counteract some of the negative influence of adverse school environments or education impact on social norms, such policies might generate and equity positive effects. However, the opposite would occur if social norms are changed to a lesser extent in low SES than in high SES individuals. This might be the case if low SES adolescents have a larger discrepancy of social norms between their social networks and society, and if low SES adolescents are more likely to rebel against authority norms. It is therefore plausible that in many cases
tobacco control policies may have equity negative instead of equity positive effects.

It has been argued that societal stigmatisation and marginalisation of smokers is partially caused by a more unaccepting social norm and public health efforts\textsuperscript{80-82}. Smokers are being blamed for the harm they inflict to themselves and others and internalise the negative connotations that are attached to smoking and its consequences\textsuperscript{80,81}. This stigma may add to the effects of marginalisation of adolescents with a poor academic performance, and tobacco control policies may therefore have unintended negative effects on those in lower social classes\textsuperscript{82}. Poor academic performance and smoking are both marginalised, and therefore smoking may be a behaviour that comes as a natural response to feelings of marginalisation in poorly performing adolescents. Increased marginalisation may reinforce individual responses of class distinction, future orientation and rebelliousness, and may thus widen inequalities in adolescent smoking (see Figure 12.1).

Rebelliousness may be fuelled by marginalisation, but may also be more directly affected by tobacco control policies. Adolescents may reject the authority's imposition of non-smoking and rebel against the tobacco control policy. Rebellion against authority may be more likely to occur among those who feel marginalised by authorities due to their lower academic performance (see Figure 12.1). In this way the effect of marginalisation on the smoking initiation process may be magnified by tobacco control policies, and thus widen socioeconomic inequalities in smoking.

The level of perceived harm of tobacco may be increased by tobacco control policies. The removal of tobacco advertisement, information through mass media campaigns and health warnings on cigarette packs\textsuperscript{83} may contribute to increasing the perceived harm that tobacco does to one's health. According to Figure 12.1 this may affect poorly performing adolescents more strongly if they were less likely to perceive the harm of smoking without these policy measures. However, poorly performing adolescents may be less responsive to policies that aim at increasing harm perception, which could lead to a widening of smoking inequalities. The assumed lower levels of future orientation, cognitive ability and self-directedness in poorly performing students may prevent them from comprehending or acknowledging the negative health effects of tobacco\textsuperscript{20,40,41}.

The opportunity to obtain tobacco is restricted by age of sales legislation and by price and tax policies. The equity impact of these policies might be positive due to four potential mechanisms. First, according to Figure 12.1, the extent to which a poorer academic performance and the resulting susceptibility to smoking lead to smoking initiation may be mitigated by
limiting the affordability and availability of tobacco. Second, higher prices may restrict the affordability of tobacco to a higher extent for low SES than for high SES adolescents. This could be due to low SES adolescents coming from lower income families. Third, low SES adolescents may be more exposed to age of sale legislation. In the US, retailer compliance with age of sales laws was found to be higher in communities with a higher poverty rate and enforcement efforts may be more effective in adolescents of low SES. Fourth, Pampel and colleagues proposed that price policies may be more effective in low SES than in high SES adolescents, because low SES adolescents are more driven by their current day-to-day situation and short-term gain. Low SES adolescents may be more likely to make decisions based on current cigarette prices than adolescents of high SES.

These mechanisms suggest that tax increases and sales restrictions are likely to have equity positive effects and this was found in a large part of the studies on the equity impact of these policies. However, not all studies found equity positive results of these policies. This may be due to two additional mechanisms. First, adolescents of low SES do not always have fewer financial resources. A study from New Zealand found that adolescents in low SES schools received higher allowances than adolescents in high SES schools, and in the SILNE data of six European countries we found that the adolescents’ academic performance and their reported pocket money were very weakly associated. This suggests that low SES adolescents are not more restricted by price and tax policies than high SES adolescents. Second, tobacco control policies may not decrease opportunity if adolescents could switch to social sources of tobacco (i.e. friends and family). A study from the UK found that although low SES adolescent smokers were more likely to obtain their cigarettes from social sources, high SES smokers were more likely to switch to social sources after the introduction of a minimum age on tobacco sales.

**Implications for tobacco control policy**

The importance of the FCTC policies remains evident, as these policies have been found to be effective at preventing smoking. This means it is still crucial for governments to implement FCTC policies, such as price increases, minimum age of sales, and pictorial health warning labels. However, these policies were not designed to decrease socioeconomic inequalities in adolescent smoking and few policies were found to have had an equity positive impact on adolescent smoking behaviour. Given this, most FCTC policies as implemented in recent years are not likely to decrease inequalities in adolescent smoking. To reduce adolescent smoking inequalities in forthcoming years, additional tobacco control policies are imperative.
Policies restricting access to tobacco are likely to be important in reducing smoking inequalities due to mitigating the transition from smoking susceptibility to smoking initiation, restricting the affordability of tobacco to a higher extent for low SES adolescents, higher exposure to age of sale laws, or a focus of low SES adolescents to short-term effects of price increases. Existing FCTC policies recommend to increase the price and ban the sales of tobacco to minors. Extensions of these policies may be higher age limits, to 21 years, a reduction of tobacco sales outlets, and a further increase in tobacco price. There is some supportive evidence for an additional effect on adolescent smoking of raising the minimum age of sale to 21 years, over and above an age limit of 18 years\textsuperscript{86-89}. Raising the minimum age will be a relatively minor change, as legislation and enforcement are already in place for age limits of 18 and 16 years. A second way of restricting access is a reduction in tobacco outlets. Studies showed that the number of outlets selling tobacco, in particular those in proximity of schools, are associated with higher smoking initiation rates\textsuperscript{90,91}. Moreover, tobacco outlets may be more concentrated in low SES areas\textsuperscript{90}. Concrete ways of reducing the number of tobacco outlets are to ban the sale of tobacco in a radius around schools, raise fees for a licence to sell tobacco, and revoke licences after tobacco has been sold to a minor\textsuperscript{91}.

National governments could extend smoke-free policies to all school premises, so that all adolescents will be exposed to smoke-free school policies. This may be extra beneficial for low SES adolescents, as their schools may be less likely to have stringent policies in place, and school policies tend to have equity positive effects\textsuperscript{68}. In many countries, schools can implement voluntary smoke-free policies, but this may lead to differential exposure. Compared to school education programmes on smoking, school smoking policies show more consistent positive results on a reduction in smoking\textsuperscript{92,93}. The nation-wide implementation of school smoking policies is therefore important not only to reduce adolescent smoking rates, but also the reduce socioeconomic inequalities in adolescent smoking.

The de-normalisation of smoking has the potential to contribute to a reduction in adolescent smoking inequalities. However, the stigmatisation and marginalisation of smokers may work counterproductive. A shift in focus of de-normalisation from smokers to the tobacco industry and the tobacco vendor may be beneficial, especially for low SES adolescents\textsuperscript{82}. By stigmatising the industry that produces a dangerous product, and de-normalising the fact that shops that sell this product at every street corner, smoking may be de-normalised without stigmatising the smoker. De-normalising tobacco industry, has been shown to be effective\textsuperscript{94,95}. An example of a successful industry de-normalising campaign is the US...
'truth' campaign. The truth campaign was targeting to 12 to 17 year old adolescents and emphasised on the tactics of the tobacco industry to sell a deadly product\textsuperscript{96}. A longitudinal study found that exposure to the campaign successfully prevented smoking initiation, independent of SES and other individual, media, and state-level influences\textsuperscript{96}.

Reducing marginalisation may not only be necessary in smokers, but also in adolescents who perform poorly in school. The educational system in countries may in part determine the extent of marginalisation of poorly performing adolescents. Highly differentiated educational tracks may construct an educational hierarchy\textsuperscript{22}, but may also lead to smaller perceived differences in academic performance. However, changing a country's educational system is something that is unlikely to happen over a public health issue and would require many well substantiated arguments from an education perspective. Schools can also play a role in diminishing marginalisation of lower performing groups. A focus on adolescents future opportunities, such as various opportunities in vocational education, could reduce feelings of stress, and rebelliousness, and increase adolescents’ orientation towards the future.

The support of adolescents who do less well in school should be anchored in the policies of schools. A hot topic in education research and practice is making educational systems more inclusive. Inclusive education aims at effectively supporting all students and improve social inclusion, thus including those with learning or behavioural difficulties, and social disadvantage\textsuperscript{97}. Inclusive education has been implemented in Europe and the US\textsuperscript{98}. It comprises the early identification of students who are performing poorly and providing timely and fitting support on a case by case basis by a team including teachers, parents, school psychologists, remedial teachers and special education teachers. Inclusive education has been implemented in August 2014 in the Netherlands, and remaining issues are the communication between care providers, a lack of competence in teachers, and resistance of parents\textsuperscript{99}.

**Implications for research**

Reviews on the impact of tobacco control policies call for an increased focus on the impact of policies on smoking behaviour of disadvantaged groups in society\textsuperscript{13,49,58,100}. An equity perspective in future research on tobacco control policies will be crucial to advance our knowledge on what works to reduce socioeconomic inequalities. Especially for new and less well studied policies, studies on the equity impact are important. These may include point of sale display bans, plain packaging, and a minimum age of 21 years on tobacco sales.
As has been suggested by other researchers\textsuperscript{74,101}, we encourage the utilisation of natural experiments to test the effects of policies. There are several designs in natural experiments which have their strengths and weaknesses. Cross-national analyses provide the ability to compare data across many settings and provide results that are generalisable over a larger population. A limitation of cross-national studies is the variation between settings on many other factors, which are often not measured. Therefore it is difficult to rule out that associations are caused by factors other than the studied policy. In time-series it is possible to control for secular trends in smoking and thus control for some of the unmeasured variation that is a limitation to cross-national analyses. Time-series can simultaneously evaluate immediate changes in prevalence and changes in slope. However, a limitation is that time-series within one country cannot rule out other effects that took place around the same time. Quasi-experimental studies have a strong design in which policy conditions are being compared with control conditions before and after the implementation of a policy. Quasi-experimental studies that are likely to provide strong evidence include multiple settings in which a policy was implemented and multiple settings in which the policy was not implemented, or not at the same time. These settings may be countries, but may also be otherwise defined geographical areas, or schools. Multiple measurements before and after the implementation of a policy provides additional power and insight into the changes in trends and the role of the secular trend. Quasi-experimental studies on longitudinal data may provide even more certainty on the causality of effects.

Studies on the size of equity effects are still very important. However, for more established policies that have been studied more extensively, it might be of more interest to focus on understanding the process of why policies do or do not reach an equity effect. Answering the questions why policies may affect certain social groups more than others provides insight into what makes policies effective and why differential effects may be reached in socioeconomic groups. This information can serve as input to future policies. Research on mechanism of tobacco control policies’ equity impact can also tell us more about the settings in which policies are likely to sort equity positive effects, which makes predicting the equity impact of future policies in different settings easier.

In these studies on mechanisms we encourage the measurement of mediating factors and causal mechanisms in various subpopulations. The theoretical framework of Figure 12.1 may provide guidance in which intermediary factors may be of interest for certain policies. We would encourage to link the equity impact of policies to the origins of smoking inequalities, i.e. answering the question whether the mechanisms that cause inequalities in
smoking are intervened by policies, or whether policies have a more distal effect on smoking inequalities by influencing environmental factors.

**CONCLUSIONS**

So far, most tobacco control policies have been effective in reducing smoking rates but not in reducing socioeconomic inequalities in smoking. An unresolved issue in tobacco control is how to reach larger reductions in smoking in low socioeconomic groups, and thus reduce socioeconomic inequalities in smoking. In order to inform future equity oriented policies, a better understanding is needed of why adolescents of lower socioeconomic strata more often initiate smoking, and how tobacco control policies can take into account the mechanisms underlying socioeconomic inequalities in smoking.

Socioeconomic inequalities in adolescent smoking are most prominent according to the adolescent’s own academic performance, and less prominent according to family socioeconomic indicators. Marginalisation of poorly performing adolescents potentially leads to rebellion, stress and a lack of future orientation. Smoking may be a logical response to marginalisation due to societal stigmatisation of smokers. Moreover, predisposing factors that are more prevalent in adolescents from lower socioeconomic backgrounds, such as lower cognitive ability and self-directedness, and more short-term time-preferences, may cause them to be more likely to perform poorly in school as well as initiate smoking. Whether these mechanisms indeed translate into inequalities in smoking also depends on the opportunities for adolescents to initiate smoking, which relates to the availability and affordability of tobacco.

Taking into account these mechanisms, we expect that, in order to reduce socioeconomic inequalities in smoking, tobacco control and school policies would have to 1. reduce the opportunities of adolescents to obtain tobacco, 2. provide individual support in schools to students who perform more poorly, and 3. de-normalise tobacco in such ways that smoking is not stigmatised or becoming a symbol of rebelliousness. Further research on how tobacco control policies can sort larger effects on smoking in lower socioeconomic groups is imperative to develop policies for a tobacco-free generation.
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