



# International Approaches to Tobacco Use Cessation Programs and Policy in Adolescents and Young Adults: Denmark

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## Abstract

**Purpose of Review** Smoking habits early in life are known to have important implications for lifetime smoking behaviors and efforts that discourage smoking among young people are essential for national tobacco control. In Denmark, various approaches have been taken to prevent or stop smoking in youth. This paper provides an overview of approaches to tobacco control policies and smoking cessation programs targeting adolescents and young adults in Denmark and presents current evidence of their effectiveness.

**Recent Findings** Extensive research documents the effect of tobacco control policies on youth smoking behavior, especially that of increasing prices on tobacco. Further, it has been suggested that strategies addressing the social aspect of smoking should be emphasized.

**Summary** This paper highlights that Denmark has an untapped potential within national tobacco control. Denmark should prioritize a comprehensive approach including enactment of tobacco control policies and implementation of interventions shown to be effective to prevent smoking initiation and encourage quitting among Danish youth.

**Keywords** Cigarette smoking · Tobacco control policy · Smoking cessation · Smoking prevention · Adolescents

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## Introduction

Smoking early in life has important implications for lifetime smoking [1, 2]. Moreover, the adolescent brain is particularly sensitive to the effects of nicotine, and it is likely that smoking in youth increases the risk of developing psychiatric disorders and cognitive impairment later in life [3, 4]. While the worldwide burden of smoking-attributable diseases and premature death is overwhelming, the potential for prevention is equally significant [5–9]. Faced with the challenges of tobacco use, several approaches have been taken both across and within countries [10–12]. In 2003, WHO's Framework Convention on Tobacco Control (FCTC) came into force. The FCTC is an evidence-based treaty that obligates 181 countries (2017), including Denmark, to implement a broad array of tobacco control measures seeking to protect both current and future generations from the consequences of tobacco use [13, 14]. Anchored in the FCTC, Denmark joined the international movement working towards a vision of a smoke-free future [15].

In Denmark, smoking trends have been declining in the past decades; however, over the last 5 years stagnation has occurred. In 2016, 15% of Danish adolescents (16–25 years)

were daily smokers [16], with a marked negative socioeconomic gradient [17]. Hence, while 12% of general public high school students smoke cigarettes daily, 37% of students in vocational school are daily smokers [18, 19]. Also, smoking students attending vocational educations smoke 15 cigarettes daily, while high school students smoke 9 cigarettes daily.

There is a growing focus on large-scale population-level approaches as a main strategy within the field of tobacco control, especially the implementation of national policies such as public smoking bans, increases in tobacco prices, advertising bans, and restrictions on sale of tobacco [5, 20, 21]. Substantial evidence indicates that tobacco control policies, particularly when combined in a comprehensive program, can reduce smoking rates significantly [2, 14, 22, 23, 24, 25, 26, 27]. Among adolescents, the purpose of such policies is to reduce the initiation of adolescent smoking, reduce smoking intensity, and encourage quitting [26]. Further, studies suggest that among young people, one of the key measures is the denormalization of smoking behavior, as early experimentation and tobacco use is nearly always undertaken in a social context [2].

To date, Denmark has no overall national strategy for tobacco control. In 2016, The Danish Health Authority (state-based entity which assist and advice the Danish Ministry of Health and other governmental, regional, and municipal authorities in the area of health and elderly care) gave their recommendations for the prevention of tobacco in the so-called Cancer Plan IV. These include the implementation of an endgame vision, the introduction of initiatives limiting the availability of tobacco, and strengthening the national smoking cessation programs [28].

Despite the absence of a national strategy, various approaches have been taken in Denmark to prevent smoking initiation and help young smokers to quit, focusing on both the structural and individual-based level. In this paper, we review approaches to tobacco control policies and smoking cessation programs in Danish adolescents and young adults. We review seven types of tobacco control policies and five types of smoking cessation programs that have been implemented in Denmark. Although some of these initiatives do not specifically focus on preventing smoking initiation among adolescents, they are of great importance as higher adult smoking prevalence is associated with a higher smoking prevalence among adolescents. The seven tobacco control policies are the following: (1) prices and taxes, (2) sale to minors, (3) advertising restrictions, (4) plain packaging and labeling, (5) mass media campaigns, (6) smoke-free policies, and (7) school-based tobacco policies. The five types of smoking cessation programs are the following: (1) face-to-face smoking cessation programs, (2) Internet- and mobile phone-based smoking cessation programs, (3) telephone quit-lines, (4) school-based smoking prevention and cessation programs in

upper secondary schools, and (5) collaboration between municipalities and primary and secondary schools. The aim is to provide an overview of the approaches implemented in a Danish setting and to present current evidence of their effectiveness. Moreover, we highlight challenges that can help future planners focus their efforts within tobacco control.

## Search Strategy

We employed a combined search methodology using database searches and contact with national experts within this field of research. Database searches for scientific literature addressing approaches to tobacco control policies and smoking cessation programs in Denmark were made in PubMed, PsycInfo, and Cochrane Database using keywords (“smoking” “tobacco use”, “adolescents”, “youth smoking”, “smoking prevention”, “policy”, “tobacco control policy”, “smoking cessation”, “smoking intervention”, and “comparative effectiveness research” and “Denmark”) separately and in combination through logical operators (OR, AND). In PubMed, MeSH terms were applied to include the most ideal keywords in the search. Supplementary literature was identified through cross-references. No restrictions on type of study or intervention were applied. We included 17 scientific peer-reviewed papers addressing approaches to tobacco control policies and smoking cessation programs in Denmark. As the scientific literature is scarce, we extended the search to comprise “grey literature” (Danish articles, legal documents, and published reports) and correspondences with national experts within the field of tobacco prevention and cessation. In order to achieve a current status of the approaches taken in Denmark, we constraint the search to literature published within the last 10 years.

## Approaches to Tobacco Control Policies

### Prices and Taxes

Extensive research has documented the effectiveness of tobacco excise taxes and high price in reducing overall tobacco use by preventing initiation and uptake among young people, promoting cessation among current users, and reducing the number of cigarettes smoked [27, 29–31]. Further, several studies find that adolescents and people on lower incomes are especially sensitive to tobacco price increases [1, 32–36]. It appears that increases in tobacco price have greater effect among the youngest adolescents as they tend to be more price sensitive and are less addicted to tobacco [37]. This approach is considered an essential measure in tobacco control among adolescents [26, 36].

## National Implementation and Evidence

As of 31st of July 2016, the price for a 20-piece cigarette package in Denmark was DKK 35 (approximately 5.6 US\$ or 4.7 €) for the cheapest brand (Skjold Red) and DKK 44 for premium brands, e.g., Marlboro Red (approximately 7 US\$ or 5.9 €). The total taxes on the most sold cigarette brand (Prince) were 75.5% [38]. When correcting for the development in the disposable household income, tobacco products have become more affordable in Denmark from 1980 to 2008 [39]. In 2012, an increase in tobacco tax was introduced, resulting in a small increase of DKK 3 (approximately 0.47 US\$ or 0.40 €) on an average 20-piece cigarette package [40]. Following EU minimum standards, another raise in tobacco taxation was adopted in January 2014, which increased the price on tobacco by DKK 0.40 (approx. 0.06 US\$ or 0.05 €) per cigarette package [41]. During 2008–2016, cigarettes became a little less affordable compared to previous years [38] and according to the Ministry of Taxation, the consumption of cigarettes decreased between 2013 and 2015 by 11% [41].

No study has evaluated the effect of tobacco price increases in Denmark on smoking trends among youth. However, a report from 2013 modeling the potential health consequences of changes in tobacco price in Denmark found that among children aged 10 or younger, an increase in tobacco price of 50% (based on the 2013 price level) would result in 5000 fewer smokers in 2030 and 1300 fewer deaths in 2090 [42]. A large population-based study found that 59% of the Danes supported increasing taxes on tobacco products in Denmark [43]. Despite the price increases currently adopted, the support for higher tobacco prices has remained the same in the Danish population during 2007–2016 (approximately 60%) [44].

## Sale to Minors

Restricting access to cigarettes and tobacco among adolescents has been a key component in tobacco control to prevent the uptake of smoking [45–47]. Although several studies suggest that access policies aiming to reduce the sale of tobacco to minors do complicate the purchase of cigarettes among adolescents, studies conclude that an active enforcement is required for the policy to be effective in terms of reducing smoking prevalence [22, 46, 48]. Thus, a comprehensive literature review found that merely enacting a law without sufficient enforcement had little or no impact on youth tobacco use [47].

## National Implementation and Evidence

In 2008, Denmark enacted a national legislation that prohibits sale of tobacco to young people under the age of 18 years. This entails that customers are required to present a valid identification if requested by the retailer [49]. Despite the fine

for retailers breaking the prohibition was raised in 2012, it has been questioned whether retailers and the authorities in practice enforce this legislation. In 2016, only two stores were fined for breaking the prohibition. Further, one of the largest nationwide Danish newspapers, Politiken, documented in a series of articles that the offense was systematic. The newspaper directed 15- to 17-year-old adolescents to buy tobacco in 221 retailers in all parts of Denmark. In 60% of cases, this succeeded [50]. Due to the lack of enforcement, the impact of the legislation is very questionable.

## Advertising Restrictions

Advertising and promotion can increase the attractiveness of tobacco use by creating favorable images, and positive attitudes and expectations regarding tobacco use [51]. This advertisement occurs in magazines, at the point of sale, through sponsorships and in social media (SoMe) [52, 53]. SoMe depiction of tobacco use is strongly correlated with future smoking [54]. This has a particular impact on adolescents, for whom social media are a part of everyday life [55]. Consequently, tobacco companies (e.g., British American Tobacco) have been observed to use this platform to promote tobacco use [56]. Tobacco advertising seems particularly influential for adolescents who have no or minimal experience with tobacco use [57]. Since studies suggest that comprehensive advertising and promotion bans can reduce tobacco consumption [22, 53, 58], strict regulations have been introduced in several countries [11].

## National Implementation and Evidence

In Denmark, tobacco advertising in TV, radio and on the Internet, in local and international magazines and newspapers, as well as on billboards and outdoor advertisement, is prohibited. In spite of this, most retailers display tobacco products in conspicuous locations with large illuminated signs. In 2016, the Danish Consumer Ombudsman reported the convenience store chain 7-Eleven and House of Prince to the police, as it was found that the tobacco display had an advertising effect. Subsequently, cigarette companies changed the layout of the displays in these specific stores [59].

In addition to the advertising ban, Denmark has a ban on tobacco promotion, e.g., on the appearance of tobacco brands in TV and movies, on sponsorship in the form of contributions, and on tobacco companies publicizing corporate social responsibility activities [38]. However, Denmark has no legislation regarding the appearance of tobacco products in TV and movies, and no agreement of anti-tobacco advertisements required before, during, or after broadcasting of visual entertainment products that depicts tobacco products. As of yet, there is no ban on tobacco companies funding or contributing

to tobacco prevention media campaigns, including those that seek to reach young people [38].

In the Danish cultural life, there is a tradition for receiving significant support from tobacco companies for exclusive rights to sell their brands at music festivals. Data from this specific activity (the marketing strategy of the tobacco industry at music festivals, and sponsoring of the cultural scene in general) are extremely sparse, but observations suggest that the tobacco industry uses music festivals to promote new products and appeal to young people. In 2014, the Danish Consumer Ombudsman concluded that the payment from British American Tobacco to the music festivals for exclusive rights of sale was not to be considered as an illegal sponsorship [60]. Nonetheless, attention must be given to the involvement of tobacco companies in the Danish cultural life. In a Danish study of visitors at the largest Danish music festival, The Roskilde Festival, initiation of tobacco use was reported by 9% of never-smokers and resumption of tobacco use was reported by 24% of past year abstainers [61].

According to a survey from 2017, 40% of Danes support a ban on sponsorships from the tobacco industry to the Danish cultural life, including music festivals. Further, 35% supports a ban on the sale of tobacco on festivals and similar venues attended by young people [44].

### Plain Packaging and Labeling

Due to the high frequency of exposure, the design of tobacco packaging constitutes an important component in tobacco control. Tobacco packaging design comes in the form of plain packaging and labeling of health warnings. Plain packaging is meant to reduce the appeal of smoking by removing all package design elements that smokers use to affiliate themselves with the brand they smoke [62]. Evidence consistently finds that plain packaging is likely to remove cigarette brand image associations and reduce the appeal of packaging and smoking among both adults and adolescents [63–66] as well as reduce false beliefs about health risks compared with branded packs [67].

Labeling of health warnings on cigarette packages is an important mean for communicating the health risk of tobacco among both smokers and non-smokers [68]. A greater effect of health warnings has been found when pictorial warnings and increasing size of warnings are used [68].

### National Implementation and Evidence

To date, Denmark has not introduced plain packaging. The Danish Health Authority estimates that there would have been approximately 26,000 fewer smokers in the age group 15+ years if plain packaging of tobacco products had been introduced in Denmark before 2016 [69].

In May 2016, the European Union Tobacco Products Directive became applicable in Denmark. Consequently,

Danish legislation now dictates that all smoked tobacco products carry combined health warnings including text warnings written in Danish and a corresponding color photograph to cover 65% of both the external front and back surface of smoked tobacco products. Further smoking cessation information (e.g., telephone number to a quit-line) must be displayed. On smokeless tobacco products, 30% of the surfaces must be covered by health warnings; however, pictorial warnings are not mandated. Further, the legislation specify the layout of the package health warnings in terms of font style, size, and color [38, 70]. No evidence on the impact of the present health warnings on tobacco packages exists in Denmark; however, the national quit-line experienced an increase in calls and in the number of people who had found the telephone number on the tobacco package after these health warnings were introduced [71].

### Mass Media Campaigns

Due to the widespread and potentially repeated exposure, mass media campaigns that promote smoking cessation and prevent initiation are important components to include in comprehensive tobacco control programs. Mass media campaigns can be used to educate the populace about the harms of smoking, inform about effective smoking cessation methods or where to get professional assistance to quit, and thus have the potential to change smoking attitudes and beliefs, increase quit attempts, and reduce smoking prevalence [72].

### National Implementation and Evidence

Throughout the last 10 years, the Danish Health Authority has launched several national anti-smoking campaigns to promote smoking cessation in the general Danish population, e.g., “Every cigarette is doing you damage” (2015–2016) [73], and within specific subgroups, e.g., “Help to quit smoking” focusing on heavy smokers and pregnant women (2009–2010) [74]. Recently, a smoking prevention campaign targeting adolescents (14–19 years), “But Why?”, has been launched. The campaign uses social media as the primary communication platform and involves people and settings that particularly affect the target group through so-called influencers [75]. The campaign has not yet been evaluated.

In 2015, the Danish Cancer Society launched a national smoking prevention campaign named “Cool without smoke” targeted at adolescents aged 16–25 years. The overall purpose was to prevent smoking among adolescents by changing social norms related to smoking and creating a culture that smoking is “not cool”. This campaign included several famous people as spokespersons, whom the target group could identify themselves with, and used visual communication measures on social media, including videos and online features, posters, and postcards. An overall effect of the

campaign on adolescent smoking behavior has not been examined; however, an evaluation of the campaign from 2016 showed that the adolescents knew (approximately half of the surveyed) and liked (70% of surveyed) the campaign [76].

### Smoke-Free Policies

Smoke-free policies banning smoking in indoor public places and workplaces constitute the one-tobacco control measure with the greatest progress worldwide since 2007 [11]. Extensive research has documented the impact of smoke-free policies on improving adverse health outcomes, especially cardiovascular diseases, reducing exposure to second-hand tobacco smoke and decreasing tobacco-related mortality. Inconsistent findings are seen for smoking prevalence and tobacco consumption [23, 24, 25]. Among children, studies report significant reductions in asthma hospitalizations after the introduction of public location smoking bans [24]. Further, an overview of systematic reviews established that protecting people from tobacco smoke was the most strongly supported government intervention [27].

### National Implementation and Evidence

In 2007, Denmark implemented “The Smoke-Free Environment Act,” prohibiting all indoor smoking in public places and workplaces, although specific exceptions were made [21, 77, 78]. The overall goal of this national smoking ban is to protect non-smokers from the harmful health effects of second-hand tobacco smoke and reduce the prevalence of smoking by preventing smoking initiation and encouraging smoking cessation [78]. From 2007 to 2010, an increase in supportive attitudes towards smoking bans in 11 public settings was observed in the Danish adult population [21]. Further, a Danish comparative study established that in the general population, smoking bans in enclosed public places are a highly cost-effective strategy compared to smoking cessation programs and status quo (no intervention) [79].

To date, the effect of the national smoking ban on adolescent smoking behavior has not been evaluated. International research, however, suggests that strict smoke-free policies may be effective strategies to reduce youth smoking [26, 29, 33, 80].

### School-Based Tobacco Policies

Given that school is one of the most important settings influencing the development of health behaviors among young people [81], legislation restricting smoking in schools has the potential to play an important preventive role. Reviews have found that some elements of school-based tobacco policies are promising, e.g., comprehensive and clear prohibitions, a consistent enforcement for both students and adults

at school, and the presence of preventive programs [82, 83]. In countries with moderate/strongly enforced school-based tobacco policies, smoking prevalence in adolescents is found to be much lower than in countries with poorly enforced/no national school-based tobacco policies [83, 84]. However, evidence of the effectiveness of such is sometimes questioned [85].

### National Implementation

Although the Danish smoking ban applies in most public settings, the scope of the ban currently differs between educational institutions. Since 2012, when the latest amendment was enacted, smoking is prohibited within the school premise in primary schools and high schools where most students are under the age of 18. However, in vocational schools, smoking is allowed for teachers as well as students within the school premise in designated smoking areas, unless the school premises include both high school and vocational education. Although most Danish vocational schools have tobacco policies, there is substantial variation in the comprehensiveness of these policies as well as their enforcement [18].

The concept of “smoke-free school hours” can be interpreted as an enhancement of the national smoking ban and means that students, staff, and visitors are not allowed to smoke during school hours—nor inside or outside the school area. This concept is increasingly implemented at Danish schools. The evidence of effect is sparse, though observations suggest that implementation is easier at primary school level than at the upper secondary level.

### Evidence

Based on the assumption that a preventive effort should be comprehensive, the Danish Cancer Society developed a multi-component school-based smoking prevention program for 13- to 15-year-olds called X:IT. The program consists of three main components: schools (1) had to be smoke-free, (2) implement a smoke-free curriculum, and (3) involve parental involvement comprising smoke-free contracts and dialogs [86]. The intervention was evaluated among seventh-grade students (mean age 12.5). It was found that students at intervention schools had significantly reduced risk of smoking after 1 year of the intervention compared to students at control schools [86]. One fourth of the schools were characterized as high implementers of the program (i.e., all three components implemented) and one third as low implementers. The smoking rates became significantly lower in high implementers (5.5%) and medium implementers (8.6%) compared to control (11.8%), whereas the smoking rate was not significantly lower in the low implementation schools (10.1%) compared to control schools [87]. Schools that had implemented the X:IT intervention to a medium or high degree had higher

levels of supportive leadership, mission-policy alignment, and personnel expertise as well as positive school and classroom climate and school culture compared to low implementation schools [88].

## Approaches to Smoking Cessation Programs

### Face-to-Face Smoking Cessation Programs

Individual and group-based smoking cessation programs have been found to be effective for the general adult population [89]; however, it is still unclear whether programs that are effective for adults can also help adolescents to quit. A Cochrane review concluded that programs for youth based on group-based counseling or combining a variety of approaches are most promising; however, the evidence remains limited. A general concern is that adolescents and young adults appear to underutilize face-to-face smoking cessation programs [90, 91].

### National Implementation

In Denmark, people, including adolescents, have access to smoking cessation programs in their municipality free of charge. Still, there is low participation rate. According to the Danish Smoking Cessation Database, an average of 1% of smokers participate each year in smoking cessation programs (study period 2001–2013). The number of smokers receiving a face-to-face smoking cessation program has decreased from 7144 participants in 2002–2003 to 5630 in 2012–2013 (21% decrease) [92]. The Danish Cancer Society has developed three smoking cessation programs; the “Gold Standard Program” (GSP) (most commonly used, individual or group-based, counseling with social support and pharmacotherapeutic treatment, quit-date is set, five meetings over 6 weeks, a meeting covering relapse prevention is recommended [92], “Come & Quit” (developed to attract low SES male smokers, flexible, quit-date is not set, based on open groups, eight weekly meetings [92]), and “XHALE”. However, only XHALE is tailored to adolescents and young adults (age group 16–25 years). XHALE is based on the Come & Quit concept, translated to the needs of young people, e.g., by taking into account the social component of smoking [93]. In addition to the counseling meetings, XHALE offers the opportunity of virtual support (see Internet- and mobile phone-based smoking cessation interventions).

### Evidence

Recently, Danish face-to-face programs such as GSP, Come & Quit, crash courses, and brief interventions were compared [92]. Out of the 42,287 participants included in the study, only

5.6% were younger than 25 years old and 80% participated in GSP interventions. The overall rate of continuous abstinence for all programs combined was 24% when non-respondents were considered smokers (intention-to-treat quit rate). Compared to Come & Quit, GSP showed higher abstinence rates in both men and women (GSP=25%; Come & Quit=14%). In general, the programs were most effective for participants who were 25 years or older.

### Internet- and Mobile Phone-Based Smoking Cessation Programs

As adolescents use mobile phones extensively, mobile phone-based interventions may be a measure of reach. Mobile phone-based smoking cessation programs that use text messaging to deliver content have emerged as an important tool in the arsenal of tobacco control efforts [94]. Two Cochrane reviews have shown that Internet-based and mobile phone-based smoking cessation programs can be effective [95, 96]; however, few trials have been conducted among adolescents and young adults [96].

### National Implementation

XHALE is an Internet- and mobile phone-based smoking cessation service developed by the Danish Cancer Society targeting young people. The program provides on-going assistance during the quitting process through a personalized universe. The content is continually tailored to each user by asking questions when signing up and throughout their quitting process. The website and the app include tests, exercises, videos, blogs, and tailored messages. Particularly, the blog in the app constitutes an important element because it provides emotional and social support [97, 98]. In 2007, frequent tailored text messages were included. Participants receive daily text messages up to 4 weeks prior to quit date, then two tailored (self-efficacy, beliefs about smoking, or tailored theme) text messages per day for 4 weeks. For the following 4 weeks, the frequency of text messages declines to four to five text messages per week. In 2015, XHALE was revised and a “test area” with three new exercises was added. The user is now able to choose a test area if he/she is not ready to set a quit date. With this new function, XHALE aims to increase the motivation among those considering quitting and appeal to those who see themselves as occasional smokers. Recently, the app won a World Summit Awards Mobile [99]; an award system that selects and promotes local digital innovation with high impact on improving society.

### Evidence

Evidence suggests that primarily young people who are motivated for smoking cessation are signing up with XHALE

[100]. At 6-month follow-up, the intention-to-treat quit rate was 8% [98]. A study including 2030 young people (mean age 19.5 years) compared the effectiveness of the tailored text messages to untailored text messages. When restricting the analysis to those participants who had chosen to receive text messages, there was significantly higher abstinence in the group receiving the tailored version of the text messages [101].

### Telephone Quit-lines

Telephone counseling for smoking cessation has the potential to reach a large number of smokers at low cost [102]. Telephone counseling with proactive recruitment (return of calls to people who have initiated the contact with the quit-line) has been shown to be effective among adults [103].

### National Implementation

The Danish National Quit-line was established in 1999 as a nationwide free-of-charge service. The counselors are often health professionals who have completed a course in smoking cessation counseling based on motivational interviewing. The quit-line service receives on average around 3000 calls each year [104], which reflects only a small proportion of Danish smokers. During the last 2 years, however, the number of calls has increased to 4000 calls yearly [71]. The telephone number of the quit-line is now printed on all cigarette packages, which may have increased the awareness of the service; in 2016, 28% of the callers knew the quit-line from cigarette packs compared to 8–14% in the preceding years [71]. The average age of the quit-line callers is 41 years; around 19% are younger than 30 years old [105]. The quit-line cooperates with the national implemented face-to-face smoking cessation courses in order to perform 6-month follow-ups; this constitutes about 6000 calls each year.

### Evidence

At 12-month follow-up, the self-reported quit rate was 19% among smokers who received counseling from the quit-line and the service is found to be cost-effective in comparison with other Danish smoking cessation interventions [105]. Still, a randomized controlled trial among Danish adults has shown no clear evidence that reactive telephone counseling (immediate response to smokers who call to ask for assistance) or an Internet- and text-message-based intervention (“E-quit”) was more effective than a self-help booklet [106]. However, *proactive* telephone counseling was found to be significantly more effective than a self-help booklet. The percentage of participants with a 12-month prolonged abstinence was 9.4, 2.2, 6.8, and 4.4% in the proactive telephone counseling, reactive telephone counseling, e-quit, and self-help booklet groups, respectively. Additionally, for smokers with low education, odds for abstinence at 1-year follow-up were four

times higher if they had received proactive telephone counseling than if they had received a self-help booklet only [106]. The effectiveness of telephone quit-lines among Danish adolescents has not been examined.

### School-Based Smoking Prevention and Cessation Programs in Upper Secondary Schools

Most smoking cessation programs for young people are implemented at schools [91]. Research suggests that prevention approaches preferably should be based on a combination of social competence and social influences interventions, whereas no evidence of effect is found for interventions that only include information [107]. The school setting presents an opportunity for reaching young people who smoke; particularly, the vocational school setting is identified as an important setting [108]. Moreover, institutional practices may support the formation of smoking communities leading to smoking having a central role in the development of students’ social relations [109, 110]. Two of the approaches that have been tested in Denmark is: educating school staff as smoking cessation counselors, and a comprehensive approach targeting smoking among vocational students.

### School Staff Trained as Smoking Cessation Counselors

At the upper secondary schools (i.e., general high schools and vocational schools), the staff (e.g., a teacher or a school health visitor) have been offered to be trained as smoking cessation counselors based on the XHALE course. However, experiences with these smoking cessation courses implemented at Danish vocational schools are that student enrolment is very low [111]. Therefore, the Danish Cancer Society recently developed a new course aimed at professionals who work with young people in high schools and vocational schools. Here, the professionals are trained to provide brief motivating conversations with the students, regardless of their motivation for smoking cessation. The course includes tools for embracing students with very different thoughts about their own smoking.

### A Multicomponent Prevention Program

In 2011–2012, the setting-based intervention “Shaping the Social” was evaluated at ten major Danish vocational schools. The purpose of the intervention was to promote students’ well-being at school by supporting the development of social relations, while offering social alternatives to cigarettes. The main components were centered on welcoming activities, establishment of cozy non-smoking areas, break policy, and daily class-based morning meetings [109]. The intervention did not affect the number of daily smokers; however, it had a preventive effect among students who smoked occasionally at school start [112•]. After 10 weeks at school, 8% of the

occasional smokers in the intervention schools became daily smokers compared to 16% in the comparison schools ( $p < 0.05$ ) [112•].

### Implementation Issues

In general, the school management plays a central role in supporting the implementation of school-based activities; the management must be committed and ensure information flow and support to teachers [112•, 113]. Other key issues concern teachers' time, competences, and motivation; in particular, the activities should make sense in relation to teachers' beliefs [111, 112•, 114].

### Collaboration Between Municipalities and Primary and Secondary Schools

Most Danish municipalities offer smoking cessation programs in the municipal setting. Furthermore, many municipalities have established a close collaboration with educational institutions regarding smoking cessation efforts. Several municipalities have good experiences with healthcare visitors trained as smoking cessation counselors who offer short conversations with students at primary and secondary schools about health-related consequences of smoking. Furthermore, some vocational schools have introduced so-called “health café” where students can drop in for a non-committal talk, e.g., about smoking [115].

### Implementation and Evidence

One of the most used approaches is smoking cessation events held by municipal smoking cessation counselors or smoke-free guides. These open events take place at the school and students are typically offered measurement of carbon monoxide. The aim is to create dialog and attention about smoking as well as recruiting students for smoking cessation courses or the XHALE app. In 2012, a randomized controlled trial including 22 secondary schools (18 commercial schools and four social and health schools; mean age 17.7 year) was conducted. The intervention was based on open events where smokers were offered carbon monoxide measurement, a short 3- to 5-min motivational interviewing counseling session, referral to web-based and telephone-based counseling, and a range of self-help materials. The study found positive short-term effects regarding smoking cessation (5% in intervention vs. 2% in control), but the effect did not maintain at 12-month follow-up (8 vs. 7%) [116].

### Conclusions

We give an overview of selected approaches to tobacco control policies and smoking cessation programs in

Danish adolescents and young adults. We provide a summary of these approaches and present current evidence on their effectiveness in a Danish setting.

Overall, Danes support the implementation of tobacco control policies. Denmark has implemented a range of tobacco control policies, but the most effective tool regarding prevention of initiation of smoking, a high price on tobacco, is passed by. For some of the policies as, e.g., the ban on sale of tobacco to minors, it is crucial that these are strictly enforced, which is not the case in Denmark. Currently, a great concern is the involvement of the tobacco industry in the Danish cultural life, e.g., at music festivals, that through hidden marketing promote tobacco use among youth. Future efforts should address this challenge. Further, new tobacco products with appeal to the youth population such as snuff, e-cigarettes, and hookah constitute a challenge in future tobacco control in Denmark.

In Denmark, several smoking cessation programs have been initiated but few are aimed at or reach young people. However, by making the telephone quit-line visible on the cigarettes packages, using the Internet and SoMe as well as increasing the focus on youth education as an important setting, interventions seek to reach adolescents and young adults. In Denmark, the vocational schools are especially an important setting. Overall, strategies that address the social aspect of smoking among youth (e.g., by inducing a change of social norms at school) should be emphasized. Further, as adolescents are more price sensitive compared to adults, a strategy that seek to prevent smoking initiation among youth is promoted by raising the price on tobacco.

Although Denmark to date has implemented several tobacco control initiatives recommended by the FCTC, this paper highlights that Denmark has an untapped potential within national tobacco control. Setting high prices on tobacco products, enforcement of prohibition of sale of tobacco to minors, implementation of plain packaging and point-of-sale display bans, stricter advertising restrictions, and a long-term national plan for coordinated tobacco control are obvious opportunities of action. Denmark should keep prioritizing a comprehensive approach including enactment of tobacco control policies and implementation of interventions shown to be effective to prevent smoking initiation and encourage quitting among Danish youth. Evaluation of these efforts is sorely needed to make sure the implementation is of high quality and that behavioral change is being achieved. Finally, Danish decision-makers need to understand that smoke-free generations hardly can be achieved without a decrease in adult smoking.



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## Compliance with Ethical Standards

**Conflicts of Interest** The authors declare that they have no conflict of interest.

**Human and Animal Rights** All reported studies/experiments with human or animal subjects performed by the authors have been previously published and complied with all applicable ethical standards (including the Helsinki declaration and its amendments, institutional/national research committee standards, and international/national/institutional guidelines).

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