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Tobacco control in Europe: A review of campaign strategies for teenagers and adults

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ABSTRACT

Background: In Europe the prevalence of tobacco use in adults and adolescents is among the highest within the WHO regions. Many resources have been allocated toward the prevention and support for smoking cessation. However, the implemented strategies in Europe have not been systematically evaluated.

Methods: A systematic literature review was carried out to identify studies that analyzed the efficacy of the main smoking-prevention campaigns conducted in Europe. PRISMA guidelines were used to systematically review and extract data.

Results: A total of 24 studies meeting inclusion criteria were identified. Each article was thoroughly reviewed and evaluated for quality, design, and methodology, with reference to the main areas of intervention: school (8); mass media (4) and technological tools (4); smoke-free environments (3); packaging (2) and taxes (3). The school programmes focusing on building skills to recognize and resist negative influences, the intensive use of media and technological equipments, health warnings and excise taxes have showed to be effective tools in reducing the tobacco use.

Conclusions: Intervention programmes to implement tobacco control policies and smoking cessation are active in many European countries. However, these programmes need to be constantly sustained to achieve a long term efficacy.

1. Introduction

The World Health Organization (WHO, 2015) has estimated that tobacco use is currently responsible for the death of about six million people worldwide annually, and directly correlated to several solid tumors (Gapstur et al., 2018). Within the WHO regions, the prevalence of tobacco use in adults and adolescents is among the highest in Europe, at 28% and 17%, respectively. In Europe, tobacco use among young people is increasing, reaching in some countries (e.g., Czech Republic, Latvia or Lithuania) the same rate as compared to adults (WHO, 2015). In 2013, the Tobacco Control Scale (TCS) study, conducted in 34 European countries, developed a TCS score, based on price per pack, public smoking bans, spending for public information campaigns, advertising bans, health warnings and smoke cessation programmes (Joossens and Raw, 2013). There were four leading countries (United Kingdom, Ireland, Iceland and Norway) but 24 countries didn't reach 50 points out of a total of 100 (Bertollini et al., 2016; Joossens and Raw, 2013).

In this study some interventions have been analyzed: anti-tobacco mass media campaigns, comprehensive smoke-free public places, bans on advertising, health warnings, cigarette price increase. These policies are included in the Framework Convention on Tobacco Control (FCTC). Since its entry into force in 2005, the Convention has become one of the most widely embraced treaties in the history of the WHO, representing a legal instrument to counteract the tobacco epidemic (McInerney, 2018; WHO, 2008; 2013). To date, full implementation of the treaty still remains low; moreover, despite prevention programmes, the percentage of teenagers starting to smoke is still high. We have reviewed the most recent developments in the field of smoke prevention and control, considering the interventions carried out in Europe (western and eastern) since 2006, after the entry into force of FCTC.

2. Methods

2.1. Search strategy

We have analyzed the main smoking-prevention campaigns conducted in Europe and their effectiveness, by selecting researches including a large sample size, a measure of efficacy and a control group.

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Table 1
Summary of trials analyzed.

Intervention	Reference	Methods			
		Country	Participants	Interventions	Outcomes
School intervention	Carreras et al. (2016)	Italy	14-15 year-olds	Intervention: the out-of-school workshop, one in depth lesson on one Smoking Prevention Tour topic, a life-skills peer-led intervention, and enforcement surveillance of school antismoking policy. Follow up: 18 months after the intervention. Control: no intervention.	Impact of social influence approach through the mediators refusal skills for smoking and the normative perception.
	Maruska et al. (2015)	Germany	10 year-olds	Intervention: the increasing generic skills and teaching or modifying substance-specific skills and cognitions. Follow up: 6-month and 15-months after the intervention. Control: no intervention.	The components that mainly explained the intervention effectiveness were the normative expectations concerning peer smoking and the resistance skill of saying “no”.
	Di Paco et al. (2013)	Italy	10-12 year-olds	Intervention: lecture on smoke hazard supported by educational material (slides, video, leaflets) and participation a theatre event with known showbusiness characters acting to smoke dissuasion. Follow up: 24-months after the intervention. Control: no intervention.	The prevalence and amount of smoking habit was significantly less, in pupils undergoing the intervention compared to control pupils.
	McGee et al. (2016)	UK	9-10 year-olds	Intervention: the professional development training, coaching sessions delivered by SFS coaches, a school assembly with a local sports star, sports equipment, a smoke free pledge, and incentives. Follow up: 8-month and 12-months after the intervention. Control: schools received their usual smoking education only.	Positive intervention effect for cigarette refusal self-efficacy at 8 and 12 months post intervention.
	Gabrhelik et al. (2012)	Czech Republic	11year-olds	Intervention: Czech translation of “Unplugged” used in EU-Dap intervention based on the comprehensive social influence (CSI) model that involve the skills to resist social pressure, information on risk factor for drug use, decision making, communication skills and assertiveness. Follow up: 1, 3, 12, 15, and 24 months after the intervention. Control: no intervention.	A statistically significant effect of the intervention was observed for daily smoking heavy smoking, frequent drunkenness, frequent cannabis use and any drug use.
	Brinker et al. (2017)	Germany	11-15 year-olds	Intervention: The presentation related to a positive nonsmoking image, interview with a patient with a tobacco-related disease, a photoaging intervention for every individual pupil. Follow up: 2 weeks, 6 months and 12 months after the intervention. Control: no intervention.	The intervention help to prevent smoking onset especially in female, students with a low educational or migrational backgrounds, but does not improve to initiate quitting.
	Nădăşan et al. (2017)	Romania	14 year-olds	Intervention: multimedia ASPIRA smoking prevention program consists in studying five modules that include tests, videos and interactive games. Follow up: 6 months after the intervention. Control: no intervention.	The results showed a significant reduction in smoking initiation among students who were exposed to at least 75% of the ASPIRA program. The project would also greatly help to limit the smoking initiation but not support for cessation of tobacco.
	Ekerbicer et al. (2007)	Turkey	9-10 year-olds	Intervention: Children with verified ETS exposure by standard questionnaire and urinary cotinine tests. Two phone interviews were conducted with the parents regarding their children's passive smoking status and its possible consequences (sperimental group). Follow-up: urinary cotinine tests 9 months after the phone interviews. Control: a brief note concerning urinary cotinine test result was sent to parents.	The data reported a significant change in smoking habits of parents both phone intervention and control groups.
Mass media and public intervention	Sims et al. (2014)	England	aged18 + years	Government-funded tobacco control television advertising.	Over the period 2002-2009, 11.2% of the decline in cigarette consumption and 13.5% of the decline in prevalence.
	Langley et al. (2012)	England and Wales	aged18 + years	Pharmaceutical company-funded advertising for nicotine replacement therapy.	An increase in tobacco control TVRs was associated with a statistically significant increase in calls in the same month.
	Langley et al. (2014)	England	aged18 + years	Use of non-intensive support: monthly calls, text requests for quit support packs and web hits on the national smoking cessation website. Use of intensive cessation support: quarterly data on the number of	There was a statistically significant decrease in quit support packs, quitline calls and webhits after the freeze, falling 98%, 65% and 34% respectively.

(*continued on next page*)

Table 1 (*continued*)

Intervention	Reference	Methods			
		Country	Participants	Interventions	Outcomes
				people setting a quit date and 4-week quitters at the NHS Stop Smoking Services (SSS).	
	Van den Putte et al. (2011)	The Netherlands and USA	aged 18 + years	The participants completed a questionnaire on various aspects of smoking cessation, the amount of exposure to anti-smoking campaigns and the presence of interpersonal communications about a smoking.	The study highlights the effect of social interaction that stimulates changes and expands the dissemination of information.
Mobile phones intervention	Brendryen et al. (2008a,b)	Norway	aged 18 + years	Intervention: fully automated programme delivered by email/ internet and mobile phone. Control: booklet with quitting info/calendar/log, national quitline number, links to online resources.	Point prevalence abstinence (no smoking in past 7 days) at 1,3,6 and 12 months post-cessation.
	Free et al. (2009, 2011)	UK	aged 16 + years	Intervention: six month programme delivered solely over mobile phone. Control: one generic text message/fortnight.	Primary: point prevalence abstinence (no smoking in past 7 days) at 6 weeks post randomization Secondary: point prevalence abstinence and continuous abstinence (< 5 cigarettes) at 26 weeks.
Smoke free environments law	Galán et al. (2007)	Spain	aged 18-64 years	This study is estimates the short-term effects of the comprehensive "Tobacco control law" introduced in Spain.	Passive exposure to tobacco smoke has changed in bar, restaurant and workplaces, but has few changed at home.
	Origo and Lucifora, (2010)	Europe	aged 18 + years	A comparison among European countries to evaluate the impact of national comprehensive smoking bans on both perceived workers' health and presence of respiratory problems within workplaces.	The introduction of comprehensive smoking bans has a significant effect on workers' perceived health and on respiratory problems.
	Ferketich et al. (2016)	Europe	aged 15 + years	A relation between thenational-level strength of tobacco control policies, and the prevalence of in-home smoking bans.	Government tobacco control policies are positively related to the individual-level tobacco policy of having an in-home smoking ban.
Health Warnings and Packaging	Agaku et al. (2015)	Europe	aged 15 + years	Data were obtained from the special Eurobarometer survey which was administered during 2012 and that investigates smoking status, socio-demographic characteristics and behavioral and cognitive impact of current health warnings.	The implementation of pictorial warnings at an EU level has a positive behavioral impact among EU citizens smokers.
	Moodie et al. (2012)	UK	aged 18-35 years	This Ecological study explores the impact that using plain (non-branded) cigarette packs in real-life settings has on young adult smokers. The participants have used a brown 'plain' packs for two weeks and their regular packs for two weeks.	The use of plain packs resulted in more negative perceptions and feelings about the pack, more negative feelings about smoking, and for some smokers it also increased avoidant and cessation behaviours.
Tobacco excise taxes	Gallus et al. (2006)	52 countries of the European region	aged 15 + years	Data were collected on annual per adult cigarette consumption, smoking prevalence, retail price of a pack	In Europe smoking consumption decreases 5–7% for a 10%increase in the real price of cigarettes.
	Ross et al. (2012)	Ukraine	aged 18 + years	This article studies the quantitative impact of 2007-2010 tax/price changes on cigarette consumption in Ukraine	This article reports of substantial declines in cigarette consumption following large tax increases in Ukraine
	Alpert et al. (2013)	Greece	aged 18 + years	The article analyzes the relationship between cigarette price increases and cigarette consumption in Greece. The effect of €2.00 per pack tax increase was projected.	A 2011 tax increase on cigarettes led to a decrease in cigarette consumption within 1 year of its implementation. The 50% price increase is estimated to lead 10% of current smokers to quit and prevent an estimated 130,000 smoking attributable premature deaths.

The articles published between 2006 and 2017 have been selected by using the search terms: “anti smoking advertising”, “mass media intervention”, “prevention in adolescence”, “tobacco control in Europe”, “tobacco excise taxes”, “tobacco warning”, “tobacco pictorial/packaging”, “smoke free environment”. The main sources were PubMed, EBSCOHost and Cochrane Library database. Only English-written peer-reviewed articles were considered.

We have categorized the following areas: 1) school-based educational intervention; 2) mass media intervention; 3) mobile phone-based interventions; 4) smoke-free environments; 5) health warning and cigarette packaging; 6) tobacco excise taxes and prices. The design and results of main published studies are summarized in Table 1.

2.2. Eligibility criteria

Studies had to fulfill the following criteria: they had to examine smoking cessation interventions provided within the Eastern and Western European countries; the interventions had to be moderately intensive or intensive interventions with a control group and a large sample (> 300 subjects); brief interventions (such as brief advice to stop smoking by a health professional) were not included. Reviews, summary reports, news items, and editorials were excluded.

Regarding to school, we considered the interventions on smoking prevention based on social skills and aimed at pre-adolescents (under 15). We have included, in adulthood (aged 18 + years), the main studies that investigated the effectiveness of interventions based on mass media and mobile phones. Finally we have included studies that have recently tested the effectiveness of the new legislation about smoking prevention and cessation including Smoke-free environment laws, new packaging end excise taxes.

2.3. Data extraction

Between July 1 st, 2016 and February 1 st, 2018, the data were extracted on the basis of study design, setting, sample size and characteristics, study length, type of intervention, and measures of effectiveness, by using the keywords described above. A formal meta-analysis of the literature was not feasible because of the differences in study population, study design and outcome measures. Hence, we used a qualitative systematic review.

3. Results

Initial searches of electronic databases and search produced 43,751 references (Fig. 1). After removing duplicates, articles not written in English, not related to Europe and published after 2006, 3431 references were screened. 223 full-text documents were analyzed by one reviewer.

Of the 223 full-text articles considered, 24 documents met the inclusion criteria: 8 studies related to school-based educational intervention; 4 about mass media intervention; 4 about mobile phone-based interventions; 3 regarding smoke-free environments; 2 about health warning and cigarette packaging and 3 about tobacco excise taxes and prices.

3.1. School-based educational intervention

The decision to start smoking usually comes within a broad social context, thus community interventions using coordinated, multi-component programmes may be effective in influencing the smoking behaviour of young people. Schools are considered as an appropriate setting for smoking prevention because they can reach large numbers of teenagers providing an opportunity to set healthy and enduring patterns of behavior (Andersen et al., 2015; Carson et al., 2011; DuRant et al., 1999). The “Luoghi di Prevenzione” (LdP) smoking prevention intervention, conducted in Italy, is a combined approach based on social competences, social influences, normative education perception, on curricula providing knowledge of health consequences, and on a revision of the anti-smoking school policy (Carreras et al., 2016). The LdP intervention resulted in a significant increase in skills to refuse smoking and also showed a strong effect on smoking reduction in all students. The main explanation for the LdP intervention effectiveness was attributed to the approach based on the resistance to peer pressure. Similar results are reported in a German school-based smoking prevention programme (“Eigenstandigwerden 5-6”) dedicated to a young student population (mean age = 10.37) (Maruska et al., 2015). The programme focused on skills training and the main mediators of the program effect were the resistance skills and self-efficacy to deny cigarette offers. The fight against tobacco can start from an educational approach addressed to school children, as it is described in the Di Paco et al. (2013) article where the Authors evaluated their educational strategy in a cohort of school children (10–12 years old) who, after answering a questionnaire on the knowledge of smoking cigarette, were divided into two homogeneous groups: one group followed a program of prevention based on informative meetings, but also on the game (cards were distributed with concepts on smoking with the recommendation to play with parents), and on participation a theatre event with known show business characters acting to smoke dissuasion, the other group without intervention (control group). At the end of the 2-year program the children who had followed the program compared to control group were less smokers, they perceived the school as a major source of support for smoking deterrence, they had more knowledge on the damages of smoking, on the components of the cigarette and on the risks of addiction. A recent study conducted in the UK has evaluated a sport-for-health smoking prevention programme (Smoke Free Sports - SFS) on smoking-related intentions and cognitions among primary school children between 9 and 10-years old (McGee et al., 2016). The intervention design was based on some social-ecological model and cognitive theories, including the Health Belief Model, Theory of Planned Behaviour and Social Cognitive/Learning. The project aimed to implement a prevention programme through enjoyable and interactive sports activities. Behaviour change techniques used with children included a reinforcement on remaining smoke-free, information on consequences of smoking, physical activity as a positive influence to avoid smoke and peer pressure to smoke. The results showed short-term positive effects on smoking attitudes among children, and cigarette refusal self-efficacy among girls.

Since 2002 the European Commission within the Community Programme for the prevention of drug dependence implemented the “UNPLUGGED project” (Thomas and Perera, 2006). A short-term follow-up showed that the program was able to reduce the use of tobacco, drugs, and intoxication drinking by 25–30% as compared to the expected trends. This intervention, based on the Comprehensive Social Influence model, recently was delivered to Czech population producing positive effects on reducing current tobacco use (Gabrhelik et al., 2012). These results are encouraging, especially taking into account the high prevalence rates of tobacco use among Czech adolescents (in 2016, more than one half of students: 55.6%) (Gyts, 2016).

A recent German article evaluated the effectiveness of the Education Against Tobacco (EAT) project that involved pupils aged 11–15 years (Brinker et al., 2017). The project included two interactive 60-minute modules carried out at school: the first part showed a positive reframe of nonsmoking, which included physical performance, saved money, addiction versus freedom. At the end of each presentation, the smoking-related respiratory diseases were discussed. The second part consisted of a classroom seminar and a photoaging intervention for the individual pupil through the Smokerface software. One year after, it was found that photoaging is effective at preventing smoking onset, especially in females and students with a low educational or migrational backgrounds. The prevalence of smoking increased of 7.2% in the control group and of 5.8% in the intervention group.

In Eastern Europe (Romania) the ASPIRE project (A Smoking

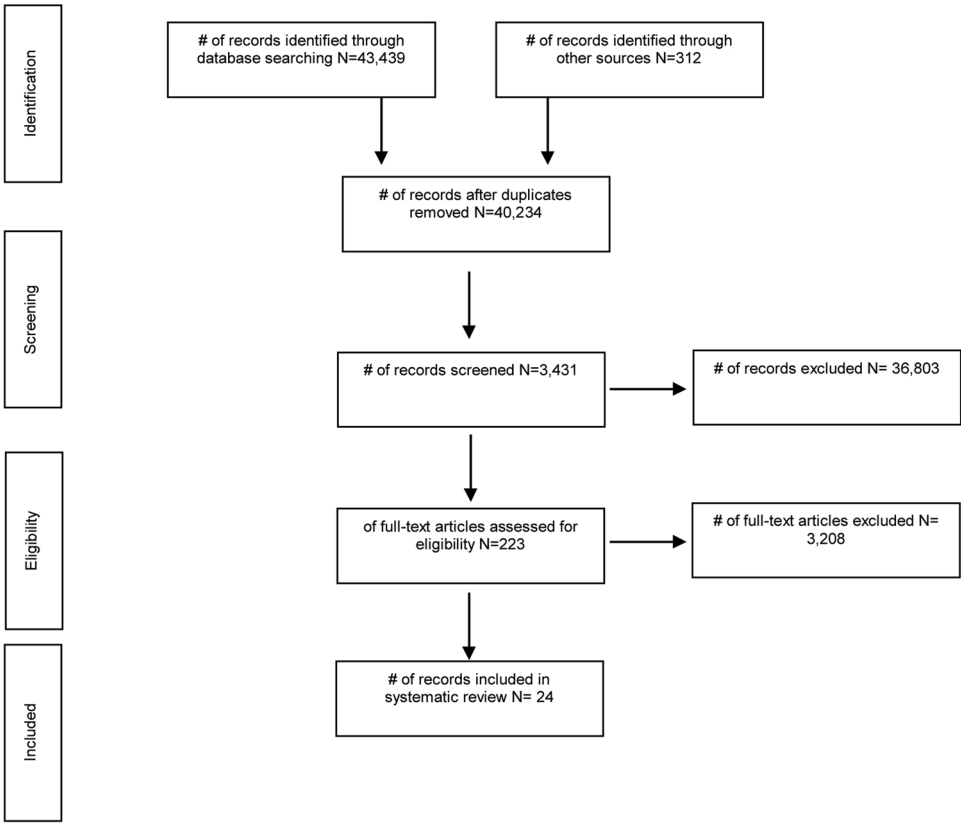

Fig. 1. Flowchart of article eligibility and final inclusion in this review.

Prevention Interactive Experience) addressed to 14-year-old students, and used a multimedia approach including interactive activities, videos, animation, and visually appealing graphics, to capture the interest of adolescents, and to educate them on the health risks of cigarette smoking (Nădăşan et al., 2017). The learning activities, based on the social cognitive theory, were addressed to the individual students' motivation for smoking. After 6 months the intervention reduced tobacco initiation, most notably among those students exposed to at least 75% of the ASPIRA program content. However, there was no effect on current smokers.

In Turkey, Ekerbicer et al. (2007) have studied how to sensitize parents to reduce the exposure to second-hand smoke at home. The authors measured the Environmental exposure to Tobacco Smoke (ETS) of school children by using self-reports and urinary cotinine tests. The results were communicated to the parents either through a phone interview that emphasized the consequences of ETS exposure (experimental group) or by sending a brief written note (control group). After 9 months, urinary cotinine post-test measurements did not differ between the two groups but were significantly lower than the pre-test, suggesting that to inform parents of their children's ETS exposure could produce positive prevention results.

3.1.1. Summary

At school age, the majority of children have never tried smoking and primary prevention measures can be implemented to ensure that these children remain no-smokers (Crone et al., 2011; Lantz et al., 2000). The physical activity could involve primary school children, by integrating smoking education messages and teaching the relationship between smoking, health and sport performances. Hence, it is important to carry out activities based not only on cognitive information, but also on social skills (Flay et al., 1998; Milton et al., 2007); in particular, to teach young people the resistance skill to say "no", to manage peer pressure and influences, that have been identified as important predictors for starting smoking (Cavalca et al., 2013; Côté et al., 2004; US Department of Health and Human Services, 1994).

Although Eastern European countries lag behind the Western countries in implementing tobacco control measures, several school projects are ongoing to reduce the prevalence of tobacco smoking in adolescents and to raise awareness among families on smoke damage.

3.2. Mass media intervention

Adult interventions are mainly aimed to support smoking cessation. About television advertising, it is possible to distinguish two types of campaigns: those funded by the government and those by pharmaceutical companies. In England, a study evaluated tobacco control advertisements (Sims et al., 2014), showing that television advertising was associated with a statistically significant reduction in average consumption of cigarettes after one and two months, respectively. In particular, over the period 2002–2009, 11.2% of the decline in cigarette consumption and 13.5% of the decline in prevalence were ascribable to the impact of these mass media campaigns. Langley et al. (2014) explored the effect of tobacco control media campaigns and pharmaceutical company-funded advertising for promotion of nicotine replacement treatments (NRT) in the process of quitting smoking (Langley et al., 2012, 2014). An improved tobacco control through advertising exposure was associated with a statistically significant increase in calls in the same month, even if not correlated with Over-The-Counter (OTC) NRT sales or prescribed NRT (Langley et al., 2012). Hence, televised tobacco control campaigns are effective in triggering quitting behaviour, although the effects seem to be short-lasting. Langley et al. (2013) studied the correlation between funding discontinuation for government anti-smoking campaigns and smoking cessation There was a statistically significant decrease in literature requests, quitline calls and web hits after the freeze, falling 98%, 65% and 34% respectively, so demonstrating a reduction in quitting-related activity during the freeze.

An international Smoking Cessation Program was “Quit and Win”, a social marketing campaign. “Quit and Win” contests offered prize incentives and a supportive environment to smokers wishing to quit (Cahill and Perera, 2011).The aim was to refrain from smoking for four weeks, and the winners participated in the prize draw. After one year, among 300 participants, the abstinence rates were evaluated. In the “Quit and Win” campaign held in 1994, the one year abstinence rates among the respondents was 23.0% in Finland, 32.1% in Russia and 34-5% in Spain/Catalonia (Korhonen et al., 1998). Furthermore, follow-up studies have shown that, after one year, on average 20% of participants have remained tobacco-free (WHO, 2007). The International Quit & Win office reported that 700.000 smokers from 80 western and eastern European countries participated in 2006; the cessation rate after four weeks remained constant (15–25%) among the participants (Cahill and Perera, 2011; Korhonen et al., 1998; WHO, 2004; 2007). A Swedish study compared the effects of two different strategies to recruit participants in this community tobacco cessation contest: nationwide mass media activities or local mobilization of collaborators (Tillgren et al., 1995). The combined mass media and local organization strategy proved to be more effective by recruiting three to six times more participants than the mass media campaign alone. Van den Putte et al. (2011), showed that these campaign stimulate discussion about smoking cessation, which influences cessation intention and behavior.

3.2.1. Summary

Mass media campaigns are effective in triggering quitting behaviour. Antismoking television advertising is associated with reductions in smoking prevalence but such campaigns need to be sustained over time. Future research should improve messages and cost-effectiveness of the mass media campaigns.

3.3. Mobile phone-based interventions

There is a growing interest regarding the use of modern technology for tobacco prevention, including mobile phones as intervention tools (Whittaker et al., 2009). Two studies have evaluated a programme named "Happy Ending" that is a fully automated intervention lasting 45 days with up to one year follow-up conducted in Norway (Brendryen et al., 2008a; 2008b). It consists of daily websites with unique content for each day of the programme, e-mail and a comprehensive mobile system with SMS and interactive voice response. The experimental group received “Happy Ending” programme while the control group received self-help materials. The results showed that the experimental group reported statistically significant higher repeated point abstinence rather than controls (22.3% versus 13.1%). In United Kingdom, a campaign named “txt2stop” randomized 5800 smokers to receive motivational text messages plus behavioral change support (txt2stop) or text messages not connected to stopping smoking (control group) (Free et al., 2009, 2011).The intervention set a quit day within three weeks and participants received an automated personalized programme of regular text messages. Participants in the control group received fortnightly, simple, short, generic text messages. The results showed significantly increased biochemical abstinence at 6 months with the txt2stop intervention. Among Eastern European countries, Ybarra et al. (2012) described a text messaging-based smoking cessation program for adult smokers in Turkey. The findings provide further support for this new intervention tool but the small sample size doesn’t not allow to generalize the data. Despite the public health needs to disseminate evidence-based smoking cessation programs, there is a lack of research regarding the efficacy of these programs in countries with a different cultural approach.

3.3.1. Summary

The mobile phone intervention could be considered an innovative smoking cessation support or an additive tool to pre-existing smoking cessation services. This intervention is already being introduced in conjunction with other programmes such as quitlines and nicotine replacement, although more rigorous studies to determine the long-term effectiveness are needed.

3.4. Smoke-free environments

Second-Hand Smoke (SHS) is defined as the smoke emitted either from the burning end of a tobacco product or by the exhalation of smoke-filled air by a smoker, each of which contains known human carcinogens (IARC, 2004). About a third of European Countries have comprehensive smoke-free laws in place; new laws banning smoking in all indoor public places and workplaces have been introduced in Ireland in 2004, followed by Italy and Sweden in 2005. A large group of countries (namely France, Germany, the Netherlands and Portugal) issued new effective laws since January 2008, while Austria and Greece have adopted comprehensive smoking bans in 2009 (European Communities, 2001). Galán et al. (2007) estimated the immediate consequences of the “Tobacco control law” inserted in Spain on January 2006, which has forbidden smoking in workplaces and has given to bars and restaurants below 100 m^2 the option to become smoke-free on a voluntary basis. The results showed a considerable reduction in exposure to environmental tobacco smoke in the workplaces (9% post-implementation of the law versus 40.5% before the law). However, in bar and restaurants, the perceived atmosphere with a very high level of tobacco smoke fell from 24.6%–10.9%. Origo and Lucifora (2010) have investigated the effects of national comprehensive smoking bans on workers’ perceived health with respect to smoke exposure within workplaces. The study analyzed the countries that enforced antismoking legislations, namely Ireland, Italy and Sweden, whereas the remaining EU-15 countries were defined as the controls. The results highlighted that more restrictive smoking bans have reduced by 1.6 percent, on average, the probability of smoke exposure and the onset of lung diseases.

A recent study evaluated whether national tobacco control policies were associated with in-home smoking bans (Ferketich et al., 2016). A higher rate of complete in-home smoking ban has been reported in the western European countries (> 80% in Finland and Sweden), as compared with the eastern European countries (< 50% Croatia, Greece, Bulgaria and Poland). In addition, among 16 European Union Member States, strong national-level, comprehensive tobacco control policies, measured by the Tobacco Control Scale, were correlated to higher rate of voluntary in-home smoking bans.

3.4.1. Summary

A strong set of government policies could act in two directions: directly, by reducing passive smoking in the workplaces, restaurants and bars, and indirectly by reinforcing tobacco control as individual decision about banning smoking at home. The positive results of the reported studies should encourage the creation of smoke-free spaces.

3.5. Health warnings and packaging

Since 2011, WHO (2011) stated a “fundamental right to accurate information about the risks of smoking”, therefore warnings on tobacco packaging have been considered an actual method to increase the awareness about risk factors. The tobacco packaging is displayed every time the product is used, so resulting in a wide exposure to the health warnings also among non-smokers (Hammond, 2011; Moodie et al., 2012). In 2013 the European Commission (Directive, 2014Council of European Union, 2014) has proposed new directives about labeling and packaging of tobacco products by introducing warning text with pictorial warning that occupies 75% of the cigarette packages, as previous studies have recommended (Mackay and Eriksen, 2002; Strahan et al., 2002). Furthermore, Articles 11 and 13 of the WHO-FCTC have implemented further measures of the packaging of tobacco products, including reduced appeal, and increased salience of health warnings.

Reports from 27 European countries have indicated that the exposure to health alerts, including pictorial warnings, lead to more behavioral changes as compared to text-only health warning labels (Agaku et al., 2015). Previous studies had shown the importance to place pictorial warnings on both sides of the package (Wakefield et al., 2014). An interesting research explored the impact of using plain (non-branded) cigarette packs in real-life settings on young adult smokers, showing that plain packaging increases negative perceptions about the pack and smoking; in addition, warnings on dark brown 'plain' packs were rated as more salient than warnings on branded packs and were viewed as unattractive by smokers (Moodie et al., 2011).

3.5.1. Summary

Warnings are mostly effective when prominently displayed both on the front and back of pack, and strengthened by using pictures. Plain packaging was implemented in Australia in 2012, in France and the United Kingdom in 2016, while in Ireland and Norway in 2017. Hungary will implement plain packaging in 2018 and Slovenia in January 2020.

3.6. Tobacco excise taxes and cigarette prices

Gallus et al. (2006) reported the inverse association between price and cigarette smoking. This study showed that, on average, smoking consumption decreases by 5–7% for a 10.0% increase in the price of cigarettes. In particular, the effect of the increase in price seem to act less in the poorest countries, probably due to the smuggling that hinders the effectiveness of these control means.

Between 2005 and 2010 the government of Ukraine increased excise taxes on cigarettes, so significantly reducing tobacco consumption by 13% in 2009 and 15% in 2010 (Ross et al., 2012). The effect of new excise tax in Greece has been analyzed, after the increasing of 83.7% of price per pack. After one year a 16% decrease in per capita cigarette consumption is reported (Alpert et al., 2013).

DeCicca et al. (2002; 2008) developed a new direct measure of state of "anti-smoking sentiment" (by asking opinions about policies restricting smoking, the promotion and advertising of tobacco products), that appears to be a potentially important influence on youth smoking prevalence (Douglas, 1998). Another study underscored that the rise of tobacco use may imply harmful compensation strategies (Evans and Farrelly, 1998). In fact, younger smokers are most likely to quit as a result of higher taxes but there is also the group that chooses cigarettes with higher tar and nicotine content. The authors suggest to tax on the base of tar and nicotine content in cigarettes, because the health hazards of smoking are linked to average daily tar absorption. A recent study showed that cigarettes with lower nicotine content reduced nicotine exposure and dependence, as well as the number of cigarettes smoked (Donny et al., 2014).With this aim, in USA the Food and Drug Administration (FDA) has suggested to impose maximum levels of nicotine for cigarette, both to counteract the problem of addiction and to transform the tobacco marketplace (Gottlieb and Zeller, 2017).

3.6.1. Summary

The general consensus is that higher prices are an effective deterrent for smoking in youths and lower socio-economic groups. However it is necessary that price increase, as part of tobacco control strategies, is coupled with a particular attention on social perception of smoking.

4. Discussion

The most efficient approach to tobacco prevention relies heavily on the programmes that recognize the social environment as a critical factor in tobacco use. In addition to individual factors, influences outside of an individual, such as peer behavior or attitudes (both positive and negative), and certain aspects of the environmental, familial, and cultural contexts, are very important. Thus, this type of intervention should focus to social skills such as the decision-making skills, the assertiveness and to resist peer influences. Recent studies about prevention projects underline the importance of acting during pre-adolescence when children have never tried smoking. An interesting prevention's project developed in Italy addressed 9–10 year-old pupils ("I do not smoke it!") and faced the problem of smoking in a soft way, suggesting a healthy lifestyle (Walce, 2011). Future prevention's programmes should implement activities based not only on cognitive information, but also on social skills. We have also reported the use of media and technological equipment (TV, mobile phone) to treat smoking addiction showing that the effectiveness may depend on campaign reach, intensity, duration and messages used. Three cost-effective tobacco control interventions have been described: bans/restrictions on smoking in public and work places; direct health warning labels on cigarette boxes and other tobacco products and price increases through higher taxes on cigarettes and other tobacco products. These studies found that the clean indoor air laws provide the additional benefit of encouraging voluntary adoption of smoke-free rules at home. One of the provisions included in WHO-FCTC is represented by pictorial warning labels on cigarette packages. Overall, the impact of health warning labels is favored by larger warnings with pictures, together with text-only messages, and by the plain cigarette packaging, that is a packaging requiring the removal of all branding (colors, imagery, corporate logos and trademarks).

We have described tax policy interventions to reduce tobacco consumption and related harms especially in younger. Nevertheless, some unintended consequences of increased price are possible, such as the greater use of smuggled cigarettes. However, it is difficult to evaluate the effects of single interventions during multiple concurrent projects; so, a better knowledge of their interactive effects should improve the design of tobacco control programmes. Which specific policy measures work best? Which combinations of policies are most effective in influencing smoking behavior? There is a substantial literature on Tobacco control interventions, including school programmes, mass media programmes, mobile phone-based interventions, smoke-free environments, health warnings and cigarette packaging, price increase by excise taxes. The available data evidence that better results could be achieved when a comprehensive set of measures are implemented together.

In this review, by analyzing the prevention actions carried out in Europe, it is evident the gap between the policies already validated in western countries and those of eastern countries. Moreover, although Eastern European countries are implementing prevention activities both at schools and through mass media, few studies have determined their long-term effectiveness.

It is remarkable that countries with less restrictive policies are strongly influenced by tobacco companies. Balwicki et al. (2016) evaluated the tobacco industry's activities in Poland: between 2006 and 2012 there was extensive tobacco industry interference with health policy by creating a positive attitude, as well as by expressing the willingness to participate to the policymaking process (Balwicki et al., 2016). Recent studies conducted in Bulgaria have confirmed that the transnational tobacco companies tried to penetrate the cigarette market and to influence tobacco excise tax policy (Skafida et al., 2014).

In conclusion, we have provided a summary of the main areas of tobacco prevention and control in Europe, with a description of recent programmatic or policy innovations. As such, this article could be useful to tobacco control advocates and policy makers; although not having detailed the study design and methodological issues in the comments on each study, we believe that this review might be helpful to researchers as well.

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References

Agaku, I.T., Filippidis, F.T., Vardavas, C.I., 2015. Effectiveness of text versus pictorial health warning labels and predictors of support for plain packaging of tobacco products within the European Union. Eur. Addict. Res. 21, 47–52.

Alpert, H.R., Vardavas, C.I., Chaloupka, F.J., Vozikis, A., Athanasakis, K., Kyriopoulos, I., et al., 2013. The recent and projected public health and economic benefits of cigarette taxation in Greece. Tob. Control 23, 452–454.

Andersen, S., Tolstrup, J.S., Rod, M.H., Ersbøll, A.K., Sørensen, B.B., Holmberg, T., et al., 2015. Shaping the social: design of a settings-based intervention study to improve well-being and reduce smoking and dropout in Danish vocational schools. BMC Public Health. https://doi.org/10.1186/s12889-015-1936-6.

Balwicki, Ł., Stokłosa, M., Balwicka-Szczyrb, M., Tomczak, W., 2016. Tobacco industry interference with tobacco control policies in Poland: legal aspects and industry practices. Tob. Control 25, 521–526.

Bertollini, R., Ribeiro, S., Mauer-Stender, K., Galea, G., 2016. Tobacco control in Europe: a policy review. Eur. Respir. Rev. 25, 151–157.

Brendryen, H., Kraft, P., 2008b. Happy ending: a randomized controlled trial of a digital multi-media smoking cessation intervention. Addiction. 103, 478–484.

Brendryen, H., Drozd, F., Kraft, P., 2008a. A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (Happy ending): randomized controlled trial. J. Med. Internet Res. 28:10 (5), e51.

Brinker, T.J., Owczarek, A.D., Seeger, W., Groneberg, D.A., Brieske, C.M., Jansen, P., et al., 2017. A medical student-delivered smoking prevention program, education against tobacco, for secondary schools in Germany: randomized controlled trial. J. Med. Internet Res. 19 (6), e199.

Cahill, K., Perera, R., 2011. Competitions and incentives for smoking cessation. Cochrane Database Syst. Rev. https://doi.org/10.1002/14651858.CD004307.pub4.

Carreras, G., Bosi, S., Angelini, P., Gorini, G., 2016. Mediating factors of a school-based multi-component smoking prevention intervention: the LdP cluster randomized controlled trial. J. Health Educ. Res. Dev. 1, 439–449.

Carson, K.V., Brinn, M.P., Labiszewski, N.A., Esterman, A.J., Chang, A.B., Smith, B.J., 2011. Community interventions for preventing smoking in young people. Cochrane Database Syst. Rev. https://doi.org/10.1002/14651858.CD001291.pub2.

Cavalca, E., Kong, G., Liss, T., Reynolds, E.K., Schepis, T.S., Lejuez, C.W., 2013. A preliminary experimental investigation of peer influence on risk-taking among adolescent smokers and non-smokers. Drug Alcohol Depend. 129, 163–166.

Côté, F., Godin, G., Gagné, C., 2004. Identification of factors promoting abstinence from smoking in a cohort of elementary schoolchildren. Prev. Med. 39, 695–703.

Crone, M.R., Spruijt, R., Dijkstra, N.S., Willemsen, M.C., Paulussen, T.G., 2011. Does a smoking prevention program in elementary schools prepare children for secondary school? Prev. Med. 52, 53–55.

DeCicca, P., Kenkel, D., Mathios, A., 2002. Putting out the fires: will higher taxes reduce the onset of youth smoking? J. Polit. Econ. 110, 144–169.

DeCicca, P., Kenkel, D., Mathios, A., Shin, Y., Lim, J., 2008. Youth smoking, cigarette prices, and anti-smoking sentiment. Health Econ. 17, 733–749.

Di Paco, A., Boffi, R., De Marco, C., Ambrosino, N., 2013. A sequential school based smoke prevention program in secondary school adolescents. Monaldi Arch. Chest Dis. 79, 8–11.

Directive, 2014 Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC Text with EEA relevance OJ L 127, 2014, 1–38.

Donny, E.C., Hatsukami, D.K., Benowitz, N.L., Sved, A.F., Tidey, J.W., Cassidy, R.N., 2014. Reduced nicotine product standards for combustible tobacco: building an empirical basis for effective regulation. Prev. Med. 68, 17–22.

Douglas, S., 1998. The duration of the smoking habit. Econ. Inq. 36, 49–64.

DuRant, R.H., Smith, J.A., Kreiter, S.R., Krowchuk, D.P., 1999. The relationship between early age of onset of initial substance use and engaging in multiple health risk behaviors among young adolescents. Arch. Pediatr. Adolesc. Med. 153, 286–291.

Ekerbicer, H.C., Celik, M., Guler, E., Davutoglu, M., Kilinc, M., 2007. Evaluating environmental tobacco smoke exposure in a Group of turkish primary school students and developing intervention methods for prevention. BMC Public Health 7 (202). https://doi.org/10.1186/1471-2458-7-202.

European Communities, 2001. Directive 2001/37/EC of the European Parliament and of the Council of 5 June 2001 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco products – Commission statement. J. Eur. Commun. 26–35 L194/26.

Evans, W.N., Farrelly, M.C., 1998. The Compensating Behavior of Smokers: Taxes, Tar, and Nicotine. Rand J. Econ. 29, 578–595.

Ferketich, A.K., Lugo, A., La Vecchia, C., Fernandez, E., Boffetta, P., Clancy, L., et al., 2016. Relation between national-level tobacco control policies and individual-level voluntary home smoking bans in Europe. Tob. Control 25, 60–65.

Flay, B., Hu, F., Richardson, J., 1998. Psychosocial predictors of different stages of cigarette smoking among high school students. Prev. Med. 27, 9–18.

Free, C., Whittaker, R., Knight, R., Abramsky, T., Rodgers, A., Roberts, I.G., 2009. Txt2stop: a pilot randomized controlled trial of mobile phone-based smoking cessation support. Tob. Control 18, 88–91.

Free, C., Knight, R., Robertson, S., Whittaker, R., Edwards, P., Zhou, et al., 2011. Smoking cessation support delivered via mobile phone text messaging (txt2stop): a single-blind, randomized trial. Lancet 378, 49–55.

Gabrhelik, R., Duncan, A., Miovsky, M., Furr-Holden, C.D.M., Stastna, L., Jurystova, L., 2012. "Unplugged": a school-based randomised control trial to prevent and reduce adolescentsubstance use in the Czech Republic. Drug Alcohol Depend. 124, 79–87.

Galán, I., Mata, N., Estrada, C., Díez-Gañán, L., Velázquez, L., Zorrilla, B., et al., 2007. Impact of the "Tobacco control law" on exposure to environmental tobacco smoke in Spain. BMC Public Health 7, 224.

Gallus, S., Schiaffino, A., La Vecchia, C., Townsend, J., Fernandez, E., 2006. Price and cigarette consumption in Europe. Tob. Control 15, 114–119.

Gapstur, S.M., Drope, J.M., Jacobs, E.J., Teras, L.R., McCullough, M.L., Douglas, C.E., et al., 2018. A blueprint for the primary prevention of Cancer: targeting established, Modifiable Risk Factors. CA Cancer J. Clin. 68, 446–470. https://doi.org/10.3322/caac.21496.

Gottlieb, S., Zeller, M.A., 2017. Nicotine-focused framework for public health. N. Engl. J. Med. 377, 1111–1114.

Global Youth Tobacco Survey (Gyts), 2016. Czech Republic Country Report. Geneva. .

Hammond, D., 2011. Health warning messages on tobacco products: a review. Tob. Control 20, 327–337.

IARC, 2004. Monographs on the evaluation of carcinogenic risks to humans. Tobacco Smoke Involuntary Smoking 83, 1–1438.

Joossens, L., Raw, M., 2013. The Tobacco Control Scale 2013 in Europe. Association of European Cancer Leagues, Brussels.

Korhonen, T., Kamardina, T., Salto, E., Korhonen, H.J., Puska, P., 1998. Quit and win 1994: evaluation in three countries. Eur. J. Public Health 8, 150–153.

Langley, T., McNeill, A., Lewis, S., Szatkowski, L., Quinn, C., 2012. The impact of media campaigns on smoking cessation activity: a structural vector Autoregression analysis. Addiction 11, 2043–2050.

Langley, T., Lewis, S., McNeill, A., Gilmore, A., Szatkowski, L., West, R., 2013. Characterizing tobacco control mass media campaigns in England. Addiction 108, 2001–2008.

Langley, T., Szatkowski, L., Lewis, S., McNeill, A., Gilmore, A.B., Salway, R., et al., 2014. The freeze on mass media campaigns in England: a natural experiment of the impact of tobacco control campaigns on quitting behavior. Addiction 109, 995–1002.

Lantz, P., Jacobson, P., Warner, K., Wasserman, J., Pollack, H., Berson, J., et al., 2000. Investing in youth tobacco control: a review of smoking prevention and control strategies. Tob. Control 9, 47–63.

Mackay, J., Eriksen, M., 2002. The Tobacco Atlas. World Health Organization, Geneva.

Maruska, K., Hansen, J., Hanewinkel, R., Isensee, B., 2015. The role of substance-specific skills and cognitions in the effectiveness of a school-based prevention program on smoking incidence. Eval. Health Prof. 39, 336–355.

McGee, C.E., Trigwell, J., Faircloug, S.J., Murphy, R.C., Porcellato, L., Ussher, M., et al., 2016. Effect of a sport-for-health intervention (SmokeFree Sports) on smoking-related intentions and cognitions among 9-10 year old primary school children: a controlled trial. BMC Public Health 16, 445.

McInerney, T.F., 2018. WHO FTCT and global governance: effects and implication for future global public health instruments. Tob. Control. https://doi.org/10.1136/tobaccocontrol-2018-054358.

Milton, B., Woods, S.E., Dugdill, L., Porcellato, L., Springett, R.J., 2007. Starting young? Children's experiences of trying smoking during pre-adolescence. J. Health Educ. Res. Dev. 23, 298–309.

Moodie, C., Mackintosh, A.M., Hastings, G., Ford, A., 2011. Young adult smokers' perceptions of plain packaging: a pilot naturalistic study. Tob. Control 20, 367–373.

Moodie, C., Stead, M., Bauld, L., McNeill, A., Angus, K., Hinds, et al., 2012. Plain Tobacco Packaging: A Systematic Review. Public Health Research Consortium, London.

Nădăşan, V., Foley, K.L., Pénzes, M., Paulik, E., Mihăicuţă, Ş., Ábrám, Z., et al., 2017. The short-term effects of ASPIRA: a web-based, multimedia smoking prevention program for adolescents in Romania: a cluster randomized trial. Nicotine Tob. Res. 19, 908–915.

Origo, F., Lucifora, C., 2010. The effect of comprehensive smoking bans in European workplaces. Forum Health Econ. Policy 16https://doi.org/10.1515/fhep-2012-0030. http://ssrn.com/abstract=1700459.

Ross, H., Stoklosa, M., Krasovsky, K., 2012. Economic and public health impact of 2007–2010 tobacco tax increases in Ukraine. Tob. Control 21, 429–435.

Sims, M., Salway, R., Langley, T., Lewis, S., McNeill, A., Szatkowski, L., et al., 2014. Effectiveness of tobacco control television advertising in changing tobacco use in England: a population-based cross-sectional study. Addiction 109, 986–994.

Skafida, V., Silver, K.E., Rechel, B.P.D., Gilmore, A.B., 2014. Change in tobacco excise policy in Bulgaria: the role of tobacco industry lobbying and smuggling. Tob. Control 23, e75–84.

Strahan, E.J., White, K., Fong, G.T., Fabrigar, L.R., Zanna, M.P., Cameron, R., 2002. Enhancing the effectiveness of tobacco package warning labels: a social psychological perspective. Tob. Control 11, 183–190.

Thomas, R.E., Perera, R., 2006. School-based programmes for preventing smoking. Cochrane Database Syst. Rev. 3. https://doi.org/10.1002/14651858.CD001293.pub2.

Tillgren, P., Haglund, B.J.A., Ainetdin, T., Thornqvist, E., Uhrbom, E., Holm, L.E., 1995. Effects of different intervention strategies in the implementation of a nationwide tobacco "quit and win" contest in Sweden. Tob. Control 4, 344–350.

US Department of Health and Human Services, 1994. Preventing Tobacco Use Among Young People A Report of the Surgeon General. Atlanta (GA). .

Van den Putte, B., Yzer, M., Southwell, B.G., de Bruijn, G.J., Willemsen, M.C., 2011.

Interpersonal communication as an indirect pathway for the effect of antismoking media content on smoking cessation. J. Health Commun. 16, 470–485.
Wakefield, M.A., Zacher, M., Bayly, M., Brennan, E., Dono, J., Miller, C., et al., 2014. The silent salesman: an observational study of personal tobacco pack display at outdoor café strips in Australia. Tob. Control 23, 339–344.
WALCE, 2011. Women against lung cancer in Europe, IT. I Do Not Smoke It – We Shall Try to See Things Clearly in the Smoky Speeches. (Accessed 14 January 2019). http://www.womenagainstlungcancer.eu/prevenzione-fumo-scuole/?lang=en.
Whittaker, R., Borland, R., Bullen, C., Lin, R.B., McRobbie, H., Rodgers, A., 2009. Mobile phone-based interventions for smoking cessation. Cochrane Database Syst. Rev. https://doi.org/10.1002/14651858.CD006611.pub4.
World Health Organization, 2004. WHO European Strategy for Smoking Cessation Policy. WHO, Geneva.
World Health Organization, 2007. The European Tobacco Control Report. WHO, Geneva.
World Health Organization, 2008. Framework Convention on Tobacco Control (WHO FCTC). WHO, Geneva.
World Health Organization, 2011. WHO Report on the Global Tobacco Epidemic. Warning About the Dangers of Tobacco. WHO, Geneva.
World Health Organization, 2013. Parties to the WHO Framework Convention on Tobacco Control. (Accessed 14 January 2019). https://www.who.int/fctc/signatories_parties/en/.
World Health Organization, 2015. WHO Global Report on Trends in Prevalence of Tobacco Smoking. WHO, Geneva.
Ybarra, M.L., Holtrop, J.S., Bağci Bosi, A.T., Emri, S., 2012. Design considerations in developing a text messaging program aimed at smoking cessation. J. Med. Internet Res. 14, e103.