

Assessing the effectiveness of a tobacco use prevention programme based on the school curriculum

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Abstract

Smoking is considered a paediatric epidemic, calling for an early preventive action through the implementation of school-based programmes. This study aimed to evaluate the short-term effectiveness of a prevention school-based programme, based on the school curriculum -Smokeout II-, in school-aged adolescents attending the 3rd cycle of basic education in schools of Braga municipality, by sex. A quasi-experimental study of the pre and post-test type with an experimental (n=159) and a control group (n=171) was held in 2014/2015. The main results showed that, from the pretest to the post-test, significant changes were observed in the control group among boys and girls: an increase in the smoking prevalence was registered among those who had never tried smoking in the pretest; among those who did not smoke or had stopped smoking in the pretest, an increase in the regular smoking was observed. A decrease between the pre and the post-test was found in the prevalence of regular smoking among boys of the experimental group, while the opposite happened in the control group, with an increase in smoking prevalence. Among girls, an increase in the regular tobacco use was observed in both groups. This smoking prevention programme has shown some effectiveness in the short-term decrease of the prevalence of students trying to smoke, both in boys and girls, and in reducing the prevalence of smoking among boys. In order to investigate if these results are kept in time, a follow-up evaluation is ongoing to assess the long-term effectiveness of the programme.

Keywords: smoking; child health; smoking prevention; programme

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Introduction

The main risk that children and adolescents are exposed to when starting smoking is to become addicted, often for their entire life (United States Department of Health and Human Services [USDHHS], 2012). Due to its consequences and high prevalence in children and adolescents, estimated at 8.8% worldwide (World Health Organization [WHO], 2009), smoking is considered a paediatric epidemic (USDHHS, 2012). In Portugal, a study with a representative sample of the Portuguese public regular schools from 5th to 12th grades, with 8764 adolescents, held in the academic year 2008/09, revealed that the prevalence of regular smokers at 15 years of age was higher among boys (12.3%; and 8.6% for girls) (Precioso, 2012), contrary to what was found in the study Health Behaviour in School-aged Children (HBSC), in Portugal (Currie et al., 2012). According to the last report of the HBSC, with data from 2013/2014 (Inchley et al., 2016), 12% of boys and 10% of girls, with 15 years of age, smoked at least one cigarette per week. This prevalence is similar to the European one (12% among boys and 11% among girls).

Regarding the evolution of the smoking trend in Portugal, according to the HBSC reports from 1997/1998 to 2013/2014 (Currie et al., 2012, 2016), the prevalence of smoking in adolescents (15 years old) has decreased from 19% to 12% among boys and from 14% to 10% among girls. From 1997 to 2014, the prevalence of smoking in adolescents of 13 years of age decreased from 5% among boys, and from 4% among girls, to 3% in both groups. Despite these declines, it is noteworthy that in the last four years there was a slight increase of tobacco use by boys aged 15 years old, from 11% in 2010 to 12% in 2014. It is noted that this rising trend of smoking among boys has been observed since 2006.

These data call for an early preventive action. Taking into account that the majority of adults who smoke daily today, most of them (88%) initiated the consumption before 18 years of age (Precioso, 2006, 2008; Precioso et al., 2012), interventions to prevent tobacco use should focus mainly on adolescents and young adults.

Based on an extensive literature review on tobacco control and preventive policies, relying on the publications from the Centers for Disease Control and Prevention (CDC) - *Guidelines for School Health Programs to Preventing Tobacco Use and Addiction* (CDC, 1994) and *Best Practices for Comprehensive Tobacco Control programs* (CDC, 1999), the work of Cheryl L. Perry and Jean L. Forster (2002) - *Youth Smoking: Can It Be Prevented or Reduced* -, and the work produced by Elisardo Becoña (Becoña, 2002), the most effective ways to prevent tobacco use by young people seem to include a combination of the following approaches: i) Environmental changes (e.g., smoke-free schools; laws that restrict permission to

smoke public places); ii) Tobacco access restriction strategies (e.g., restriction of tobacco purchase age, prohibition of sale in vending machines; iii) Prohibitions on advertising and promotion of tobacco and rising prices; iv) Programmes based on the school curriculum; v) Involvement of parents; vi) Smoking cessation programmes for adolescents; vii) Preventive campaigns in the media. Evidence shows that multicomponent interventions are effective in reducing the prevalence of smoking among adolescents, and that programmes developed in schools constitute a fundamental part of these interventions (Precioso, Samorinha, & Macedo, 2016).

School-based programmes are composed by a set of sessions (usually between 6 and 15 sessions during a scholar year). They should be developed and implemented during the school activities' time. These programmes are often implemented at the 2nd and 3rd cycles, but should have reinforcement sessions, taking into account their efficacy decrease over time (Precioso, Samorinha, & Macedo, 2016). Among these, the ongoing programmes integrating the social context have proven to be effective (Mercken, 2012; Precioso, 2000, 2003).

In Portugal, some preventive programmes based on the school curriculum have been developed: "Não fumar é o que está dar" ["Not smoking is fashionable"] (Precioso, 1999, 2000), aimed at students from the 7th grade, and "Querer é Poder I and II" ["To want is power I and II"], for adolescents aged 12 to 14 years (Vitória et al., 2000, 2001). As an example, the programme "Não fumar é o que está a dar" (Precioso, 2000) is an intensive, specific and cross-sectional programme aimed at preventing tobacco use. It has a main focus on working the psychosocial risk factors to smoking and is composed by a set of 15 weekly one-hour sessions. It is addressed to students of the 7th grade (which are the students at a higher risk of starting to smoke) and was designed to be applied in the disciplines of Natural Sciences, Portuguese, Visual Education, Mathematics and Physical Education. The sessions of the "Não fumar é o que está a dar" are grouped into basic components: tobacco smoke information; building an attitude about smoking; making a decision about the future use of tobacco; correction of the "overestimation phenomena", an exaggerated perception of the number of smoking friends and, lastly, to develop skills to resist to social pressures to smoke. Each component corresponds to a session or a series of sessions aimed at minimizing the impact of a given risk factor associated with the beginning of the consumption by young people. This programme is published (Precioso, 2000) and the sessions can be found online at the following website: <http://webs.ie.uminho.pt/tabagismo/>.

Although these programmes have shown efficacy (Sequeira, 2003; Vitória, Silva, & De Vries, 2011), they were developed without a thorough understanding of the smoking determinants by gender. It was therefore important to improve and modernize

existing programmes in Portugal, taking into account gender differences, and to assess their short- and long-term impact.

This study aimed to evaluate the short-term effectiveness of a prevention school-based programme, based on the school curriculum (Smokeout II), among school-aged adolescents attending the 3rd cycle of basic education (9th grade) in schools of Braga municipality, by sex.

Methods

This is a quasi-experimental study of the pre and post-test type with an experimental (n=159) and a control group (n=171), held in 2014/2015. The experimental group consisted of three classes from the 9th grade, belonging to two secondary schools at Braga (municipalities of Vila Verde and Palmeira). It had 72 boys and 87 girls, with a mean age of 14.6 years old. The control group consisted of three classes from the 9th grade from two secondary schools at Braga (Lamações and Póvoa de Lanhoso), composed by 91 boys and 80 girls, with a mean age of 14.7 years old. The socioeconomic level of the students at both schools was similar.

The intervention consisted in the Smokeout II programme. A pre-test was applied in both groups, the programme Smokeout II was implemented in the experimental group and, after, both groups were re-evaluated in a post-test, through the administration of a self-fulfilment questionnaire. This instrument was designed to assess knowledge, attitudes, intentions and behaviour regarding smoking.

Analyses were conducted using SPSS Statistics, version 20.0 for Windows. Proportions were

described and the independent associations were calculated through the Chi-Square Test or the Fisher’s Exact Test, according to the adequacy to the data. A significance level of 0.05 was considered.

Intervention

This is an interdisciplinary programme, constituted by 14 sessions aimed at different prevention levels: first, preventing tobacco use; second, at least to delay the beginning of tobacco use; third, reduce the prevalence of smokers and, lastly, reduce the amount of cigarettes smoked, among smokers. The sessions of this programme aim to provide strategies to increase knowledge about smoking and its consequences, to develop social skills to learn how to refuse tobacco offers and to reduce the overestimation of the smoking prevalence.

The prevention programme “Smokeout I and II, 2nd and 3rd cycles” was developed based on the previous programme “Não fumar é o que está a dar” (Precioso, 1999, 2000). In the development process, some sessions from the original programme for the 6th and the 9th grades were selected and reformulated. Also, new sessions were added, focusing on more risk factors for smoking, particularly associated with smoking use among females (evaluated within a research project about the factors associated with smoking, with a focus on gender [PTDC/IVC-PEC/5133/2012]). The current programme is aimed at the 6th grade and has a “reinforcement” component, aimed at the 9th grade. A description of the sessions for the 9th grade can be found in Chart 1.

Chart 1
Intervention plan of the smoking prevention programme Smokeout II – 9th grade

No	Title of the session	Courses						
		Natural Sciences	Physical Chemistry	Maths	Portuguese	Sports	Visual Education	Other
	Pretest questionnaire administration	Class director						
1	Effects of tobacco use in health	X						
2	Effects of tobacco in appearance and body + Teacher’s sheet						X	
3	Cigarette composition		X					
4	Problems associated with Second-hand Smoking (SHS) exposure		X					
5	Benefits of non-smoking for women	X						
6	Is smoking still fashionable?			X				
7	Calculation of the economic cost of smoking use + Educator’s sheet			X				
8	Smoking and exercise					X		
9	Communication styles				X			
10	Factors associated with smoking							X
11	Helping friends how to quit smoking							X
12	Influence of smoking in life projects							X
13	Making an opinion and deciding on smoking behaviour							X
14	Declaration “promise” of a smoke-free life							X
	Post-test questionnaire administration	Class director						

Results

Regarding the intention to try smoking in the next month (Table 1), among boys who have never tried smoking, in the experimental group, a decrease in the prevalence in this intention was found between the pre- and post-test (from 18.6% to 15.9% saying they would “yes or maybe” try to smoke). In an opposite direction, in the control group, an increase was registered (from 6.3% to 11.9% saying “yes or

maybe” to smoking experimentation in the next month).

Among girls, a decrease was found in the experimental group in the intention to try smoking in the next month, between the pre- and post-test, from 8.8% to 6.8%, whereas the control group showed a slight variation was found, from 23.5% to 23.3% saying “yes or maybe” to smoking experimentation in the next month.

Table 1
Intention to try smoking in the next month (no, maybe or yes), among participants who have never tried smoking

Sex	Group	Pretest							X ² (p)	Post-test							Pre/Post-test	
		No		Maybe		Yes ⁺		No		Maybe		Yes ⁺		X ² (p)	X ² ⁺⁺	p		
		N	%	N	%	N	%	N		%	N	%	N				%	
Boy	Control	44	91,7	3	6,3	1	2,1	3,13	37	88,1	5	11,9	-	-	0,29	8,48	,108	
	Experim.	35	81,4	9	18,6	-	-	(,077)	37	84,1	7	15,9	-	-	(,592)	11,43	,006	
Girl	Control	38	74,5	12	23,5	1	2,0	4,62	33	76,7	10	23,3	-	-	5,70	7,32	,020	
	Experim.	52	91,2	5	8,8	-	-	(,032)	55	93,2	4	6,8	-	-	(,017)	5,49	,144	
Total	Control	82	82,8	15	15,2	2	2,0	0,25	70	82,4	15	17,6	-	-	1,90	14,94	,002	
	Experim.	87	87,0	13	13,0	-	-	(,621)	92	89,3	11	10,7	-	-	(,168)	20,84	,001	

Experim. = Experimental

+Not included in Chi-Square Test

++Fisher's Exact Test

Regarding the intention to try smoking in the following year (Table 2), among boys who have never tried smoking, in the experimental group, an increase in the prevalence in this intention was found between the pre- and post-test (from 23.3% to 27.3% saying they would “yes or maybe” try to smoke in the following year). Also in the control group, an increase was registered (from 12.8% to 16.7% saying “yes or maybe” to smoking experimentation next year).

Among girls, a decrease was found in the experimental group in the intention to try smoking in the following year, between the pre- and post-test, from 14.0% to 8.5%, whereas in the control group an increase in the intention to try smoking next year was found, from 21.6% to 30.2%.

Table 2
Attitude towards the possibility of trying smoking next year (no, maybe or yes), among participants who have never tried smoking

Sex	Group	Pretest							X ² (p)	Post-test							Pre/Post-test	
		No		Maybe		Yes ⁺		No		Maybe		Yes ⁺		X ² (p)	X ² ⁺⁺	p		
		N	%	N	%	N	%	N		%	N	%	N				%	
Boy	Control	41	87,2	6	12,8	-	-	1,69	34	81,0	7	16,7	1	2,4	1,27	10,59	,024	
	Experim.	33	76,7	10	23,3	-	-	(,194)	32	72,7	12	27,3	-	-	(,259)	7,17	,016	
Girl	Control	35	68,6	11	21,6	5	9,8	1,65	27	62,8	13	30,2	3	7,0	9,00	11,08	,003	
	Experim.	49	86,0	8	14,0	-	-	(,199)	53	89,8	5	8,5	1	1,7	(,003)	8,33	,040	
Total	Control	76	77,6	17	17,3	5	5,1	0,03	61	71,8	20	23,5	4	4,7	1,80	22,19	<,001	
	Experim.	82	82,0	18	18,0	-	-	(,960)	85	82,5	17	16,5	1	1,0	(,179)	17,86	<,001	

Experim. = Experimental

+Not included in Chi-Square Test

++Fisher's Exact Test

Regarding cigarette experimentation, in the control group, 23.1% of boys and 20.8% of girls who had never tried to smoke at the pre-test, have tried a cigarette in the post-test, while in the experimental group, the percentage of adolescents who tried their

first cigarette from pre to post-test were significantly lower: 6.7% among boys and 5.0% among girls ($p=0.001$ and $p=0.011$, respectively) (Table 3).

Table 3
Cigarette experimentation, in the control and experimental group, in the post-test.

Group	Total			Boy			Girl		
	N	%	X ² (p)	N	%	X ² (p)	N	%	X ² (p)
Control	23	21,9	11,56	12	23,1	4,97	11	20,8	6,44
Experimental	6	5,7	(,001)	3	6,7	(,026)	3	5,0	(,011)

Concerning the beginning of a regular use of tobacco, while in the control group, from the pre to the post-test, 9.0% of boys and 9.9% of girls became regular smokers, in the experimental group, a lower percentage of participants started smoking: 2.3%

among boys and 1.3% among girls ($p=0.011$ and $p=0.007$, respectively) (Table 4).

Table 4
Prevalence of regular smoking, in the control and experimental group, in the post-test.

Group	Total			Boy			Girl		
	N	%	X ² (p)	N	%	X ² (p)	N	%	X ² (p)
Control	14	9,4	7,165	7	9,0	1,834	7	9,9	5,819 ⁺
Experimental	3	2,1	(,011)	2	3,3	(,298) ⁺	1	1,2	(,007)

Conclusion

This smoking prevention programme has shown some effectiveness in the short-term decrease of the prevalence of students trying to smoke, both in boys and girls, and in reducing the prevalence of smoking among boys.

Although evidence has been showing that multicomponent interventions are the most effective in reducing the prevalence of smoking among adolescents, and that preventive programmes developed in schools constitute a fundamental part of these interventions, there was a huge lack of resources available for the Portuguese schools to use in the field of smoking prevention in adolescence. Being specifically developed to be implemented at schools, this preventive programme constitutes an important and needed tool for the schools and the teachers, aimed at offering them a useful resource for health education, which can broaden their educational impact. Also, being a programme based on the school curriculum, it proposes an innovative approach to the teaching of health education contents, being imbued in the predefined contents for the other courses.

However, this study have some limitations that should be acknowledged. The small sample size and the fact that data derives only from one region in Portugal, implies caution regarding data generalizability. A higher sample size would allow other statistical analysis, with a higher statistical power. Mainly, this calls the attention to the need to develop more studies implementing this programme in schools inserted in different socioeconomic neighbourhoods, and different regions along the country. Also, a follow-up designed to evaluate long term impacts of the programme would increase the chance of observing long term differences. It should be directed to deep evaluate changes in attitudes and knowledge of the adolescents involved in the programme, which could be achieved with a complementary qualitative approach.

From a research perspective, it is necessary to further evaluate if these results are maintained in time and to deepen the understanding about the different impacts it had among boys and girls, being ongoing a follow-up evaluation to assess the long-term effectiveness of the programme. If proven effective, this programme could be implemented, at a national level, among schools, in order to

contribute to promote an equitable and global preventive intervention in smoking use by adolescents and young adults.

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References

Becoña, E. (2002). *Bases científicas de la prevención de las drogodependencias*. Delegación del Gobierno para el Plan Nacional sobre Drogas. Madrid: Ministerio del interior. ISBN: 84-8150-240-5.

Centers for Disease Control [CDC] (1994). *Preventing tobacco use among young people: a report of the Surgeon General*. Atlanta, GA: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention. DHHS publication no. S/N 017-001-00491-0.

Centers for Disease Control [CDC] (1999). *Best Practices for Comprehensive Tobacco Control Programs*. Atlanta GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, CDC, 1999.

Currie, C. et al. (2012). *Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC). Study: International report from the 2009/2010 survey*. Copenhagen: WHO Regional Office for Europe.

Inchley, J., et al. eds. (2016). *Growing up unequal: gender and socioeconomic differences in young people's health and well-being. Health Behaviour in School-aged Children (HBSC) study: international report from the 2013/2014 survey*. Copenhagen, WHO Regional Office for Europe, 2016 (Health Policy for Children and Adolescents, No. 7).

Mercken, L. et al. (2012). The effectiveness of school based smoking prevention interventions among low and high SES European teenagers. *Health Education Research*, 27 (3), 459-469.

Perry, C. L., & Forster, J. L. (2002). Youth Smoking: Can it Be Prevented or Reduced? TC online presentations. Retrieved from Tobacco control. www.tobaccocontrol.com.

Precioso, J. (1999). *Não fumar é o que está a dar*. Lisboa: Instituto de Inovação Educacional.

Precioso, J. (2000). *Não fumar é o que está a dar: guia para o professor*. Braga: Casa do Professor.

Precioso, J. (2006). Boas práticas em prevenção do tabagismo no meio escolar. *Revista Portuguesa de Clínica Geral*, 22, 201-222.

Precioso, J. (2008). Fatores de risco relacionados com as várias fases “da carreira” de fumador: Implicações para a prevenção. *Análise Psicológica*, 2, 177-192.

Precioso, J. & Macedo, M. (2003). La contribución de los programas de influencias sociales (complementados con otras estrategias) en el control de la epidemia tabáquica. *Adicciones*, 15 (4), 369-377.

Precioso, J., Samorinha, C., Macedo, M., & Antunes, H. (2012). Smoking prevalence in Portuguese school-aged adolescents by gender: can we be optimistic? *Revista Portuguesa de Pneumologia*, 18(4), 182-187.

Precioso, J., Samorinha, C., & Macedo, M. (2016). A prevenção do tabagismo em meio escolar: teoria e prática. In: J. A. Garcia del Castillo & P. C. Dias, eds. *Estudos sobre o Tabaco: Contributos para a Prática*. Braga: Axioma - Publicações da Faculdade de Filosofia; p. 83-107.

Sequeira, M., & Precioso, J. (2003). Educação para a prevenção do comportamento de fumar: Avaliação de uma proposta de intervenção pedagógica no 3º ciclo do ensino básico. In A. Neto; F. Nico; J. Chouriço; P. Costa & P. Mendes. *Didática/Metodologia da Educação: percursos e desafios*. Évora: Departamento de Pedagogia. Universidade de Évora, 1219-1228.

United States Department of Health and Human Services [USDHHS] (2012). *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Vitória, P., Raposo, C., Peixoto, F. Carvalho, A. & Clemente, M., (2001). “*Querer é poder II*” – programa de prevenção do tabagismo para o 3º ciclo do ensino básico – manual do professor. Lisboa: Conselho de Prevenção do Tabagismo, Ministério da Saúde.

Vitória, P., Silva, S., & De Vries, H. (2011). Avaliação longitudinal de um programa de prevenção do tabagismo para adolescentes. *Revista de Saúde Pública*, 45(2), 343-354.

Vitória, P., Simões-Raposo, C., Peixoto, F., & Clemente, M. (2000). *“Querer é Poder I” – Programa de Prevenção do Tabagismo para o 3º Ciclo do Ensino Básico – Manual do Professor*. Conselho de Prevenção do Tabagismo – Ministério da Saúde.

World Health Organization [WHO] (2009). *WHO Report on the Global Tobacco Epidemic: implementing smoke-free environments*. Geneva: World Health Organization.