

Psychosocial factors related with smoking behaviour in Portuguese adolescents

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Few studies describe the factors associated with smoking behaviour in Portuguese adolescents. Hence, smoking prevention activities are not based on research findings. This study analyses the differences between smokers and nonsmokers and factors associated with smoking behaviour in a sample of Portuguese adolescents. A questionnaire was administered to seventh grade students of 25 schools from five municipalities near Lisbon ($n=3064$). The majority of them were never smokers (71.3%), 21.9% smoked less than monthly, 2.1% monthly and 4.7% weekly or more frequently. Smokers were older, had lower school achievement, had more money available to spend, preferred less to be together with nonsmoking people and were more likely to be allowed to smoke at home, to use alcohol and to perform various risky behaviours. Nonsmokers were less convinced of the advantages and more convinced of the disadvantages of smoking, encountered more social norms against smoking, perceived less smoking in others, felt less pressure to smoke from peers, were more confident to refuse cigarettes and had a lower intention to smoke next year. Intention to smoke, self-efficacy expectations to refuse smoking, social influence and alcohol consumption were the most relevant variables associated with smoking behaviour. Consequently, Portuguese smoking prevention

programmes should include activities aimed to help adolescents to deal with pressure to smoke from peers and to improve self-efficacy expectations to refuse cigarettes. Our findings also confirm the link between smoking and alcohol use suggesting that the prevention of these two behaviours should be complementary. *European Journal of Cancer Prevention* 15:531–540 © 2006 Lippincott Williams & Wilkins.

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Introduction

Smoking is the single main preventable cause of disability and premature death throughout the world (USDHHS, 1994; OMS, 1997; WHO, 1997, 1999). The estimated annual mortality associated with tobacco consumption in the European Union is 540 000 and worldwide mortality from tobacco is likely to rise from about four million deaths a year in 1998 to about 10 million a year in 2030 (Peto *et al.*, 1994). For most of these deaths to be avoided, a substantial proportion of adult smokers will have to quit and children will need to avoid smoking initiation (WHO, 1988, 1998, 1999).

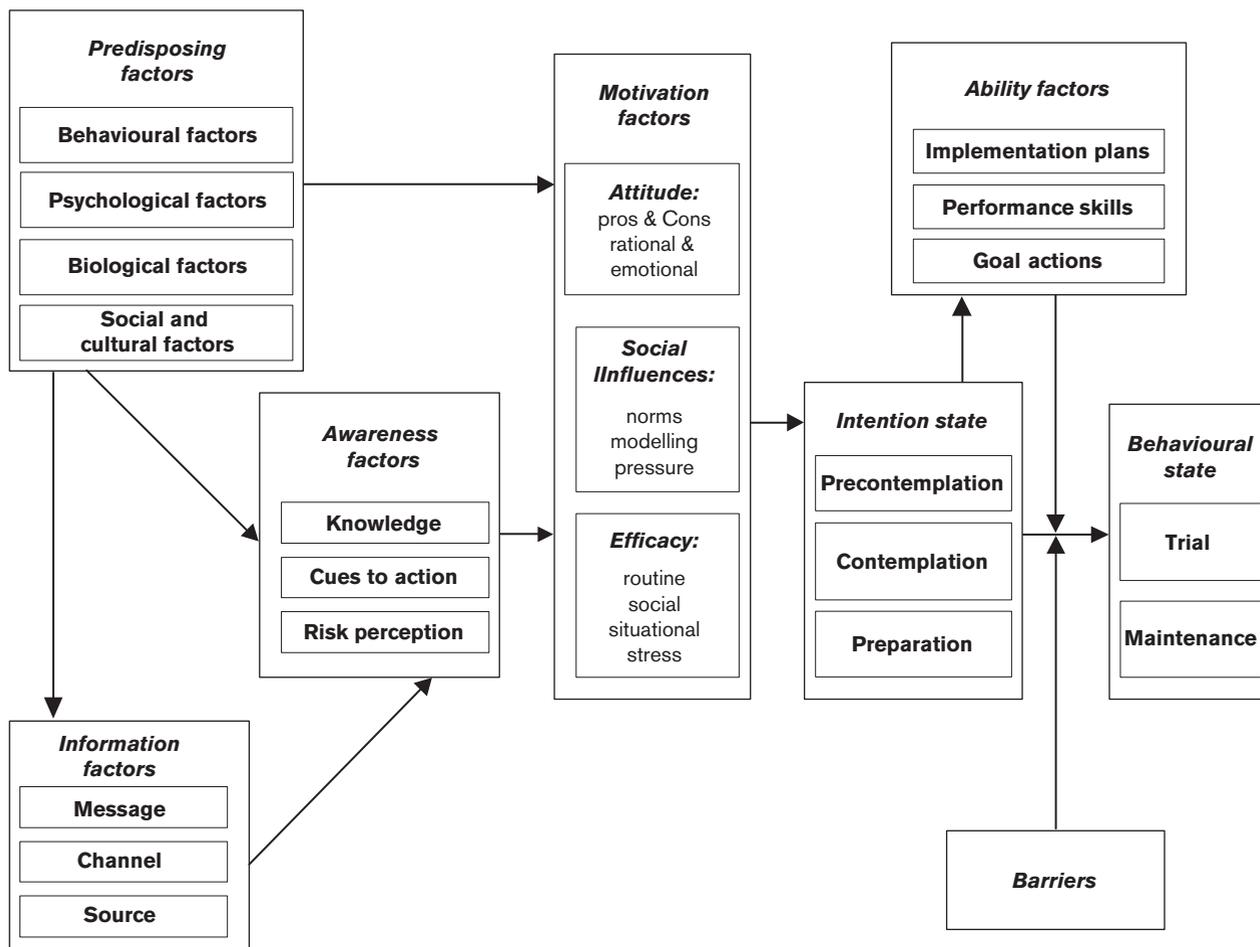
In Portugal, health surveys found a smoking prevalence rate under 20% (Ministerio da Saude, 1988, 1997, 2000). Portuguese smoking prevalence rates are low if compared with those of other countries within the European Union (Peto *et al.*, 1994, 1998). Smoking among Portuguese adolescents, specially among girls, has, however, increased in recent years (Hibell *et al.*, 1997, 2000; Currie *et al.*, 1999; Matos *et al.*, 2000) and the mean age for starting to

smoke was below 14 years (Machado *et al.*, 1995; Azevedo *et al.*, 1999). Hence, effective smoking prevention programmes targeted at youth are needed in Portugal. To be effective, smoking prevention programmes should be based on scientific knowledge about the factors related with smoking (De Vries and Kok, 1986; Green and Kreuter, 1991; Conrad *et al.*, 1992).

Age, sex, perceived smoking behaviour of peers, siblings and parents, self-efficacy expectations to refuse smoking, intention to smoke, alcohol use and other risk behaviours are factors that have proved to be associated with smoking initiation and behaviour (De Vries *et al.*, 1988, 1995; De Vries, 1989; USDHHS, 1994; Ariza and Nebot, 2002; Holm *et al.*, 2003).

Several cognitive models can be used to explain health behaviours, such as smoking. For the purpose of this study, we used an integrated model, the I-Change Model (see Fig. 1) (De Vries *et al.*, 2003b, 2005a, b), that incorporates elements of several health and social

Fig. 1

I-Change Model (De Vries *et al.*, 2003b, 2005a, b).

psychological theories, such as the Theory of Reasoned Action (Ajzen and Fishbein, 1980), the Theory of Planned Behavior (Ajzen and Madden, 1986; Ajzen, 1988, 1991) and the Transtheoretical Model of Change (Prochaska and DiClemente, 1983). The I-Change Model, and its previous versions, has been used to successfully explain several health behaviours (De Vries *et al.*, 1995, 1998, 2003b, 2005a, b; De Vries and Mudde, 1998).

The focus of this study is to analyse the motives of youngsters who do or do not smoke, and hence focus on the role of attitudes, social influences and self-efficacy. In the I-Change Model, attitudes are determined by both affective and cognitive consequences that a person holds towards the behaviour (De Vries and Mudde, 1998, 1998; De Vries *et al.*, 2003a). With regard to the social influences, three distinct concepts are postulated and demonstrated to be of importance: social norms, perceived behaviours of others and direct social pressure or support to perform a particular behaviour (De Vries

et al., 1995). Finally, self-efficacy expectations, a construct derived from Social Learning Theory (Bandura, 1986), is conceptualized by the perceived level of difficulty or confidence to perform the behaviour instead of by the perceived control (De Vries *et al.*, 1988; Dijkstra *et al.*, 1996). Three different types of self-efficacy have been found to be relevant: the level of confidence of a person to realize the behaviour if under emotional strains (emotional or stress self-efficacy), when pressured by others to engage in unhealthy behaviours (social self-efficacy) and when being confronted with changing daily routines (routine self-efficacy) (Kremers *et al.*, 2001a; Holm *et al.*, 2003).

The main goal of this study is to present and discuss psychosocial factors related to smoking in Portuguese adolescents. Differences between smokers and nonsmokers will be described using predisposing variables, the motivational variables and intention to smoke in the next year. Among this set of variables, the ones related with

smoking behaviour will be presented. Furthermore, implications for prevention activities in Portugal will be discussed.

Methods

Procedure and participants

The present study was part of the European Smoking Prevention Framework Approach (ESFA) (De Vries *et al.*, 2003b). In April 1998, all 64 public schools with seventh grade from five municipalities near Lisbon were invited to participate in this project. Twenty-five accepted by sending a letter of participation and by appointing a school contact teacher. Schools that refused participation had the similar distribution in terms of urban/rural location, and did not differ with respect to socioeconomic level. Many schools that refused participation indicated that they were too busy with other items and hence did not want to participate in a large study with 3 years of interventions. While this may imply that the school personnel may be somewhat less motivated to address the tobacco issues, we have no reasons to assume that the motivational structures of the students from these schools differ from students of schools that decided to participate. Hence, it is likely that our results can be generalized to the population of Portuguese youngsters of this age group.

In October, pupils were asked by the teacher to fill in a questionnaire in their class. From 3134 questionnaires received, 3064 (97.8%) were completed satisfactorily (questions on smoking behaviour were answered) and were included in the analysis.

Questionnaire

The questionnaire was based on a review of the literature and earlier work about adolescent smoking behaviour (De Vries and Kok, 1986; De Vries *et al.*, 1988, 1995; Kremers *et al.*, 2001b). The validity of self-reported smoking by adolescents has been shown to be good and in high concordance with biological indicators when measurement is under optimal conditions assuring anonymity (Murray *et al.*, 1987; Stacy *et al.*, 1990; Dolcini *et al.*, 1996). Hence, measurement conditions were optimized by assuring to the respondents the strict confidentiality of their responses. A pilot of the questionnaire with Portuguese adolescents contributed to the selection of items and item formulation. The questionnaire assessed smoking behaviour, intention to smoke, attitudes, social influence, self-efficacy expectations and several demographic and risk behaviours items.

Smoking behaviour status was assessed by five questions about current smoking and lifetime smoking (Kremers *et al.*, 2001a, b; Kremers, 2002) resulting in four sub-groups: never smokers (never having smoked a cigarette,

not even a puff), less than monthly smokers, monthly smokers and weekly smokers.

Intention was measured by one question on adolescents' intention to smoke within the next year. Answering categories ranged from 'definitely not' (= -3) to 'definitely yes' (= 3).

Attitude was measured by 12 items on a 7-point scale (-3 to 3), six were pros of smoking (e.g. 'If I smoke, or were to smoke, my friends will pay me attention', coded between 'much more attention' = 3 to 'much less attention' = -3) and six were cons of smoking (e.g. 'If I smoke, or were to smoke, I consider my behaviour wrong' coded 'very wrong' = 3 to 'very right' = -3). Results from pilot studies suggested that sometimes items could be measured using only one side of the scale, as the inclusion of the other side would lower the credibility of the question (De Vries and Kok, 1986). For example, when measuring the effects of smoking on slimness, we did not include the opposite side because this is highly unlikely. Factor analysis revealed two meaningful factors: the cons of smoking (Cronbach's $\alpha = 0.72$) and the pros of smoking ($\alpha = 0.66$).

Social influence was measured by assessing social norms (items for mother, father, brother(s), sister(s), best friend, friends, people in same school year and teachers), perceived smoking behaviour of others (the same items) and social pressure to smoke from important others (the same items). Social norms were measured by a 7-point scale assessing adolescents' perceptions of whether important others think they should smoke or not. For example, 'My best friend thinks that I definitely should not smoke' (= -3) to 'I definitely should smoke' (= 3). Perceived behaviour of others was measured by a 2-point scale (e.g. does your father smoke?; no = 0, yes = 1) or by a 5-point scale (e.g. how many people in the school year smoke?; nobody = 0 to almost all = 4). Social pressure to smoke was measured by a 5-point scale (e.g. have you ever felt pressure from your mother to smoke?; never = 0 to very often = 4).

Self-efficacy expectations to avoid smoking were measured by 12 items on a 7-point scale derived from an earlier Dutch research (De Vries and Kok, 1986) and a validated instrument by Lawrance (1988). The items measure the adolescents' perception of their ability to refrain from smoking when they were pressured by others (e.g. when with friends who smoke, are you able not to smoke), or when under emotional strains (e.g. when you feel upset, are you able not to smoke) or when they were in daily routines (e.g. when you are watching TV, are you able not to smoke). Answering categories ranged from 'I am sure I will smoke' (= -3) to 'I am sure I won't smoke' (= 3). Factor analysis revealed three factors:

Table 1 Differences between smokers and nonsmokers – external variables; *n* = 3064; 143 (4.7%) smokers and 2921 (95.3%) nonsmokers

	Nonsmokers (<i>n</i> = 2911) (%)	Smokers (<i>n</i> = 143) (%)	Test of significance
Sex			
Boy (%)	95.9	4.1	
Girl (%)	94.7	5.3	$\chi^2 (1) = 2.46$
Origin			
Portugal (%)	95.1	4.9	
Others (%)	96.6	3.4	$\chi^2 (1) = 2.07$
Religion			
Catholic (%)	95.1	4.9	
Others and no religion	95.5	4.5	$\chi^2 (1) = 0.29$
School achievement last year			
Lower third of my class (%)	88.8	11.2	$\chi^2 (2) = 21.22^{***}$
Middle (%)	94.9	5.1	
Best third (%)	97.2	2.8	
Job father (5 or more days)			
No (%)	94.3	5.7	
Yes (%)	95.7	4.3	$\chi^2 (1) = 2.26$
Job mother (5 or more days)			
No (%)	95.6	4.4	
Yes (%)	95.2	4.8	$\chi^2 (1) = 0.34$
Both parents in the house			
No (%)	95.7	4.3	
Yes (%)	94.3	5.7	$\chi^2 (1) = 2.50$
Allowed to smoke home			
Yes (%)	87.8	12.2	
No (%)	97.1	2.9	$\chi^2 (1) = 89.97^{***}$
	Mean (SD)	Mean (SD)	
Age (10.8–16.8)	13.45 (1.02)	14.47 (1.31)	<i>t</i> (150.5) = -9.28 ^{***}
Money available to spend (0=nothing to 7=more than 7.5)	2.15 (1.80)	3.45 (2.17)	<i>t</i> (151.7) = -7.06 ^{***}
Prefer to be together with nonsmoking people (-3=very much disagree to 3=very much agree)	1.81 (1.66)	0.15 (1.76)	<i>t</i> (154.6) = 11.1 ^{***}
Risk behaviours ^a			
I drink alcohol	0.31 (0.80)	1.43 (1.60)	<i>t</i> (145.5) = -8.35 ^{***}
I gamble for money	0.08 (0.42)	0.20 (0.72)	<i>t</i> (146.8) = -2.09*
Use of cannabis or marijuana	0.01 (0.19)	0.28 (0.89)	<i>t</i> (142.7) = -3.56 ^{***}
I sniff substances to become intoxicated	0.02 (0.22)	0.18 (0.73)	<i>t</i> (143.3) = -2.54*
Use heroin, amphetamines, crack, cocaine or LSD	0.01 (0.18)	0.12 (0.61)	<i>t</i> (143.3) = -2.07*
Use sleeping pills or tranquilisers	0.03 (0.27)	0.11 (0.56)	<i>t</i> (145.3) = -1.68
Use ecstasy, "E" or XTC	0.02 (0.20)	0.08 (0.47)	<i>t</i> (144.6) = -1.69
Skive, play truant from school	0.19 (0.59)	0.59 (0.85)	<i>t</i> (148.7) = -5.47 ^{***}
Fight with others	0.20 (0.50)	0.46 (0.76)	<i>t</i> (148.1) = -4.11 ^{***}
Destroy things	0.09 (0.40)	0.28 (0.74)	<i>t</i> (146.1) = -3.00 ^{**}
Steal things	0.05 (0.34)	0.26 (0.74)	<i>t</i> (144.9) = -3.32 ^{**}

^a0=never to 4=at least once a week.

P*<0.05; *P*<0.01; ****P*<0.001.

emotional/stress self-efficacy ($\alpha = 0.96$), social self-efficacy ($\alpha = 0.95$) and opportunity/routine self-efficacy ($\alpha = 0.95$). The item 'When you are at the shops with friends', originally intended to be an opportunity self-efficacy item, turned out to be more closely correlated with the social self-efficacy factor.

External or distal variables included in the study were age, sex, origin, religion, school achievement last year, father working full-time, mother working full-time, living in a complete family, allowed to smoke at home, money available to spend weekly, prefer to be together with nonsmoking people and a set of risk behaviours with 11 variables (see Table 1).

Analysis

Data analysis included basic descriptive statistics of the respondents on the most important variables. Differences between (weekly) smokers and non (weekly)-smokers

were analysed using χ^2 and *t*-tests. Correlations were calculated between all the attitude, social influence and self-efficacy scales and indices, intention to smoke next year and smoking behaviour (variable with four levels: never smokers, less than monthly smokers, monthly smokers and weekly smokers). In multiple linear regression analysis, smoking behaviour with four levels was used as dependent variable, external variables entered in block 1 (forward used as method of variable entry), attitudes, social influences and self-efficacy factors were entered in block 2 (forward used again as method of variable entry) and intention to smoke in next year entered in block 3. Analysis was performed using SPSS 11.0 (PSE, Lisbon, Portugal).

Results

Participants

From a total of 3134 adolescents, 3064 (97.8%) were included in the sample (the ones who did not answer smoking behaviour questions were excluded). The mean

Table 2 Differences between smokers and nonsmokers in attitudes, social influences, self-efficacy and intention; *n* = 3064; 143 (4.7%) smokers and 2921 (95.3%) nonsmokers

Attitude beliefs If I smoke...	Nonsmokers Mean (SD)	Smokers Mean (SD)	Test of significance
Calm nerves (0 to 3)	0.28 (0.70)	1.37 (1.10)	<i>t</i> (147.6) = -11.76***
Feel relaxed (-3 to 3)	-0.31 (1.28)	0.73 (1.45)	<i>t</i> (153.1) = -8.44***
Confident in company (-3 to 3)	-0.62 (1.41)	0.27 (1.29)	<i>t</i> (158.0) = -7.94***
Easy part of crowd (-3 to 3)	-0.43 (1.72)	0.36 (1.29)	<i>t</i> (167.7) = -7.01***
More attention (-3 to 3)	-0.74 (1.62)	-0.11 (1.24)	<i>t</i> (166.6) = -5.84***
Helps to be slim (0 to 3)	0.10 (0.43)	0.43 (0.85)	<i>t</i> (145.5) = -4.50***
Wrong (-3 to 3)	2.40 (1.09)	1.03 (1.49)	<i>t</i> (149.4) = 10.79***
Stupid of me (0 to 3)	2.40 (1.04)	1.37 (1.18)	<i>t</i> (152.0) = 10.21***
Taste horrible (-3 to 3)	1.00 (1.44)	-0.13 (1.34)	<i>t</i> (158.4) = 9.83***
Unfriendly (-3 to 3)	1.17 (1.53)	0.24 (1.38)	<i>t</i> (159.4) = 7.78***
Bad for health (0 to 3)	2.74 (0.70)	2.29 (0.92)	<i>t</i> (150.2) = -5.77***
Sorry ever started (0 to 3)	2.11 (1.29)	1.71 (1.21)	<i>t</i> (3062) = 3.62***
Social norms			
Mother (-3 to 3) ^a	-2.23 (0.99)	-1.75 (1.24)	<i>t</i> (151.0) = -4.571***
Father (-3 to 3) ^a	-2.15 (1.06)	-1.61 (1.33)	<i>t</i> (150.9) = -4.812***
Brother(s) (-3 to 3) ^a	-1.43 (1.31)	-0.92 (1.48)	<i>t</i> (3062) = -4.518***
Sister(s) (-3 to 3) ^a	-1.23 (1.32)	-0.84 (1.34)	<i>t</i> (155.9) = -3.382**
Friends (-3 to 3) ^a	-1.59 (1.32)	-0.52 (1.69)	<i>t</i> (150.6) = -7.504***
Best friend (-3 to 3) ^a	-1.85 (1.22)	-0.90 (1.69)	<i>t</i> (149.3) = -6.695***
People in year (-3 to 3) ^a	-1.69 (1.26)	-0.69 (1.65)	<i>t</i> (150.2) = -7.154***
Teachers (-3 to 3) ^a	-2.05 (1.15)	-1.41 (1.38)	<i>t</i> (151.7) = -5.442***
Perceived behaviour			
Mother smokes (0 to 1) ^b	0.24 (0.43)	0.27 (0.44)	<i>t</i> (3062) = -0.80
Father smokes (0 to 1) ^b	0.43 (0.50)	0.50 (0.50)	<i>t</i> (3062) = -1.53
Brother(s) smoke(s) (0 to 1) ^b	0.09 (0.29)	0.32 (0.47)	<i>t</i> (147.4) = -5.75***
Sister(s) smoke(s) (0 to 1) ^b	0.06 (0.24)	0.19 (0.39)	<i>t</i> (147.3) = -3.82***
Best friend smokes (0 to 1) ^b	0.06 (0.24)	0.64 (0.48)	<i>t</i> (145.5) = -14.38***
Friends smoke (0 to 4) ^c	0.34 (0.83)	2.26 (1.41)	<i>t</i> (146.9) = -16.13***
People in year smoke (0 to 4) ^c	0.09 (0.43)	0.49 (1.02)	<i>t</i> (144.5) = -4.64***
Teachers smoke (0 to 4) ^c	0.34 (0.90)	0.70 (1.26)	<i>t</i> (149.1) = -3.37**
Pressure			
From mother (0 to 4) ^d	0.09 (0.56)	0.24 (0.88)	<i>t</i> (147.7) = -1.96
From father (0 to 4) ^d	0.12 (0.62)	0.24 (0.83)	<i>t</i> (149.0) = -1.66
From brother(s) (0 to 4) ^d	0.06 (0.44)	0.29 (0.92)	<i>t</i> (145.2) = -2.86*
From sister(s) (0 to 4) ^d	0.06 (0.42)	0.20 (0.77)	<i>t</i> (146.1) = -2.06
From friends (0 to 4) ^d	0.22 (0.63)	0.88 (1.25)	<i>t</i> (145.5) = -6.23***
From best friend (0 to 4) ^d	0.10 (0.48)	0.56 (1.09)	<i>t</i> (144.7) = -5.05***
From people in year (0 to 4) ^d	0.24 (0.67)	0.97 (1.34)	<i>t</i> (145.5) = -6.49***
From teachers (0 to 4) ^d	0.09 (0.51)	0.17 (0.70)	<i>t</i> (149.5) = -1.28
Self-efficacy^f			
When with others who smoke (-3 to 3) ^e	2.27 (1.30)	0.02 (1.86)	<i>t</i> (148.9) = 14.32***
When with friends who smoke (-3 to 3) ^e	2.19 (1.35)	-0.66 (1.72)	<i>t</i> (150.6) = 19.48***
When offered a cigarette (-3 to 3) ^e	2.30 (1.30)	-0.16 (1.98)	<i>t</i> (148.0) = 14.72***
When friends offer a cigarette (-3 to 3) ^e	2.27 (1.32)	-0.52 (1.90)	<i>t</i> (148.8) = 17.41***
When feel upset (-3 to 3) ^e	2.26 (1.34)	-0.63 (1.78)	<i>t</i> (149.0) = 19.18***
When feel depressed (-3 to 3) ^e	2.32 (1.29)	-0.16 (1.84)	<i>t</i> (148.8) = 15.87***
When feel nervous (-3 to 3) ^e	2.30 (1.31)	-0.69 (1.85)	<i>t</i> (149.1) = 19.05***
When feel worried (-3 to 3) ^e	2.34 (1.27)	-0.47 (1.89)	<i>t</i> (148.3) = 17.57***
When at shops with friends (-3 to 3) ^e	2.34 (1.27)	-0.70 (1.74)	<i>t</i> (149.5) = 20.60***
When watching TV (-3 to 3) ^e	2.49 (1.15)	0.92 (1.82)	<i>t</i> (147.6) = 10.25***
When doing homework (-3 to 3) ^e	2.53 (1.12)	1.18 (1.81)	<i>t</i> (147.4) = 8.80***
When on way home from school (-3 to 3) ^e	2.47 (1.18)	0.16 (2.14)	<i>t</i> (146.3) = 12.81***
Intention			
To smoke in the next year (-3 to 3) ^f	-2.18 (1.02)	0.62 (1.42)	<i>t</i> (149.2) = -23.29***

^a -3 = definitely I should not smoke to 3 = definitely I should smoke.

^b 0 = no; 1 = yes.

^c 0 = almost nobody to 4 = almost all of them.

^d 0 = never to 4 = very often.

^e -3 = I'm sure I will smoke to 3 = I'm sure I won't smoke.

^f -3 = definitely not to 3 = definitely yes.

P* < 0.05; *P* < 0.01; ****P* < 0.001.

age of the sample was 13.5 years (SD = 1.1), 50.9% were girls, 50% were Catholics and some of them (13%) were repeating the seventh grade. The average pocket money per week was a little above 5€. The nationality of 82% was Portuguese and almost all the others were from the Portuguese former colonies in Africa. The majority lived

with both parents (78%), had both parents employed full-time (75% of fathers and 60% of mothers), 88% were not allowed to smoke at home, 68% preferred to be together with nonsmoking people and 77% had never consumed alcohol (4% were weekly drinkers). The overall majority did not intend to smoke in the coming year (85%) and did

not intend to smoke in the future (72%). In the previous year, the majority did not have classes about smoking (60%) and did not talk at home about smoking (52%).

Smoking behaviour

In this sample ($n = 3064$), 71.3% of the adolescents ($n = 2186$) reported to have smoked never, 21.9% ($n = 672$) reported to smoke less than monthly, 2.1% ($n = 63$) reported to smoke monthly and 4.7% ($n = 143$) reported to smoke weekly or more frequently.

Differences between smokers and nonsmokers

The differences between smokers and nonsmokers were significant in the majority of the external variables included in the study (Table 1). Smokers were older, had lower school achievement, had more money available to spend, preferred less to be together with nonsmoking people, were more likely to be allowed to smoke at home and were more likely to perform various risky behaviours.

With regard to the attitude, smokers and nonsmokers differ on all items (Table 2). The differences were bigger in the perception that smoking might calm nerves, is wrong, and is something stupid to do. Furthermore, the high scores of both groups on the belief that smoking is bad for health indicates that both groups are quite aware of this aspect.

With regard to social influence, both groups differed significantly on most items (Table 2). Smokers had less negative perceptions of social norms against smoking from all proposed important others, perceived more smokers among others and felt more pressure to smoke from their peers. The biggest differences were found in perceived behaviour of friends and best friends. Adolescents whose best friend smoked were also more often smokers (34%) than their peers whose best friend did not smoke (2%, $P < 0.001$).

With regard to self-efficacy, the two groups differed on all items (Table 2). Smokers were less confident in their ability to refuse cigarettes and to avoid smoking behaviours when at shops with friends, when feeling nervous, when with friends and when feeling upset.

As expected, a large difference in the item intention to smoke next year was found. Smokers had already a positive intention towards smoking in the next year.

Relations among attitudes, social influences and self-efficacy

Table 3 shows that the majority of the correlation scores were significant and almost all have the expected directions. All the correlation scores with smoking behaviour were significant and the highest were intention to smoke next year ($r = 0.57$), social self-efficacy

(-0.54), emotions self-efficacy ($r = -0.51$) and perceived behaviour of peers ($r = 0.51$). The correlation scores of both attitudes scales with smoking behaviour ($r = 0.28$ and $r = -0.28$) were modest, but significant. The correlation scores of social norms indices perceived behaviour of parents and pressure to smoke from parents with behaviour were low but significant.

Table 4 shows the results of the linear regression analysis. Three models were presented. The first, including only external variables, explained 26% of the variance. Factors significantly associated with smoking were alcohol consumption, being older, preferring less to be together with nonsmoking people, being allowed to smoke at home, high levels of money to spend, skiving from school, a Portuguese origin, mother working 5 or more days per week, fighting with others, lower school achievement and to be a girl.

In the second model attitude scales, social influence indices and variables and self-efficacy scales were introduced after the external variables. This model explained 48% of the variance. Factors associated with smoking were alcohol consumption, being older, high levels of money available to spend, preferring less to be together with nonsmoking people, being allowed to smoke at home, a Portuguese origin, mother working 5 or more days per week, to believe more on pros of smoking, perceiving more pros of smoking, perceiving more smokers among peers and siblings, feeling more pressure to smoke from peers and teachers, perceiving social norms more in favour of smoking from siblings and having lower self-efficacy expectations towards refraining from smoking.

The third model, adding intention to smoke in the next year to the previous, explained 51% of the variance. Factors significantly associated with smoking were alcohol consumption, being older, high levels of money available to spend, being allowed to smoke at home, a Portuguese origin, mother working 5 or more days per week, perceiving more smokers among peers and siblings, feeling more pressure to smoke from peers and teachers, having lower self-efficacy expectations towards refraining from smoking and having a higher intention to smoke next year.

In the second and third models, self-efficacy opportunities and pressure to smoke from teachers had β -scores with different signals of the correlations scores (see Tables 3 and 4). The same occurred with money available to spend in the third model. This effect is likely to be caused by the high intercorrelations between these variables and others also included in the model. The three self-efficacy scales have very high intercorrelations and the intercorrelations among pressure to smoke

Table 3 Correlations between smoking behaviour, motivational variables and intention to Smoke (n=3064)

	Smoking Behaviour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1. Pros Smoking	0.28																		
2. Cons Smoking	-0.28	-0.42																	
3. Social norms Parents	0.14	0.13	-0.21																
4. Social norms Siblings	0.11	0.13	-0.12	0.45															
5. Social norms Peers	0.24	0.25	-0.27	0.52	0.46														
6. Social norms Teachers	0.14	0.13	-0.24	0.48	0.32	0.55													
7. Perceived behaviour Parents	0.09	0.03	-0.02	0.00	0.05	0.00	-0.01												
8. Perceived behaviour Siblings	0.22	0.10	-0.09	0.07	-0.04	0.10	0.05	0.06											
9. Perceived behaviour Peers	0.51	0.23	-0.25	0.15	0.07	0.24	0.15	0.03	0.20										
10. Perceived behaviour Teachers	0.11	0.07	-0.07	0.07	0.03	0.06	0.04	0.01	0.05	0.15									
11. Pressure Parents	0.07	0.04	-0.09	0.12	0.03	0.07	0.08	0.04	0.03	0.04	0.03								
12. Pressure Siblings	0.11	0.06	-0.08	0.11	0.03	0.08	0.09	-0.02	0.14	0.09	0.05	0.63							
13. Pressure Peers	0.32	0.16	-0.12	0.12	0.03	0.20	0.10	0.00	0.13	0.33	0.11	0.45	0.47						
14. Pressure Teachers	0.05	0.02	-0.09	0.10	0.01	0.08	0.09	-0.02	0.04	0.07	0.13	0.64	0.58	0.47					
15. Social Self-efficacy	-0.54	-0.31	0.35	-0.20	-0.13	-0.27	-0.18	-0.06	-0.14	-0.38	-0.10	-0.09	-0.10	-0.26	-0.07				
16. Opportunities Self-efficacy	-0.37	-0.23	0.29	-0.19	-0.09	-0.19	-0.17	-0.00	-0.10	-0.28	-0.10	-0.10	-0.10	-0.19	-0.10	0.81			
17. Emotions Self-efficacy	-0.51	-0.30	0.32	-0.18	-0.10	-0.24	-0.18	-0.05	-0.13	-0.38	-0.09	-0.09	-0.12	-0.25	-0.09	0.87	0.82		
Intention to smoke	0.57	0.30	-0.37	0.18	0.15	0.29	0.21	0.07	0.15	0.44	0.08	0.06	0.08	0.24	0.04	-0.53	-0.41		-0.50

Correlations in bold are significant ($P < 0.05$).

Table 4 Multiple regression analysis with smoking behaviour as dependent variable (n=3064)

	Model 1 Change in			Model 2 Change in		Model 3 Change in	
	R ^a	R ²	β	R ²	β	R ²	β
External variables							
Age	0.28**	0.039	0.20***	0.039	0.08***	0.039	0.08***
Sex (boy-girl)	0.02	0.002	0.05**	-	-	-	-
Origin (Portugal-others)	-0.02	0.002	-0.05**	0.002	-0.04**	0.002	-0.03*
School achievement last year (lower third-best third)	-0.12**	0.003	-0.05**	-	-	-	-
Money available to spend (0 euros to more than 7.5 euros)	0.20**	0.010	0.10***	0.010	0.06***	0.010	-0.05***
Job mother (5 or more days a week; no-yes)	0.02	0.001	0.03*	0.001	0.04**	0.001	0.03*
Alcohol (0=never to 4=weekly)	0.36**	0.129	0.23***	0.129	0.11***	0.129	0.08***
Skive from school (0=never to 4=weekly)	0.20**	0.005	0.06***	-	-	-	-
Fight with others (0=never to 4=weekly)	0.07**	0.001	0.05**	-	-	-	-
Allowed to smoke at home (no-yes)	0.18**	0.016	0.12***	0.016	0.05***	0.016	0.04**
Prefer to be together with nonsmoking people (-3=very much disagree to 3=very much agree)	-0.30**	0.052	-0.17***	0.052	-0.05**	-	-
Attitudes, social influences, self- efficacy							
Pros smoking	0.28**			0.001	0.03*	-	-
Perceived behaviour of peers	0.51**			0.051	0.21***	0.051	0.17***
Pressure from peers	0.32**			0.008	0.20***	0.008	0.11***
Perceived behaviour of siblings	0.22**			0.005	0.08***	0.005	0.07***
Pressure teachers	0.05*			0.003	-0.07***	0.003	-0.06***
Social norms siblings	0.11**			0.001	0.03*	-	-
Self-efficacy social	-0.54**			0.132	-0.35***	0.132	-0.27***
Self-efficacy opportunities	-0.37**			0.009	0.20***	0.009	0.20***
Self-efficacy emotional	-0.51**			0.005	-0.16***	0.005	-0.15***
Intention to smoke next year	0.57**					0.030	0.24***
Total explained variances		R=0.51; R ² =0.26		R=0.70; R ² =0.48		R=0.71; R ² =0.51	

^aR=Correlation with behaviour. All correlations were significant.

*P<0.05; **P<0.01; ***P<0.001.

indices are much high compared with their correlations with smoking behaviour. This situation might have caused the current suppressor effects changing the signal of the β (Tabachnick and Fidell, 1996) (see Tables 3 and 4).

Discussion

Our study of seventh grade 12–13-year-old students comprised 71% never smokers. Only 4.7% of our sample was regular (weekly) smokers. Smokers and nonsmokers differed on a vast amount of demographic and cognitive variables.

The model used in this study explained 51% of the total variance of smoking behaviour, slightly higher than the average explained variance in a set of studies on addictive behaviours reviewed by Godin and Kok (1996). The results showed that most of the impact of the external variables (the demographic factors and risk behaviours) was mediated by the cognitive factors (attitude, social influence, self-efficacy beliefs and the intention to smoke next year). The model, however, did not fully mediate

the impact of these external variables. In particular, the impact of alcohol use suggests that this risk behaviour remained to have a unique contribution to the prediction of smoking behaviour. Similarly, social self-efficacy also was found to have an important unique contribution; the latter effect might be explained by the fact that this could reflect the impact of peers namely how to cope with this type of peer influence.

In contrast to many other studies, attitude was not found to play an important unique role. One explanation may be that beliefs correlate moderately with self-efficacy (*r* ranging 0.23 to 0.35), which leaves less unique variance to be explained by attitude (Tabachnick and Fidell, 1996). More longitudinal research is, however, needed to further study the role of attitudes in this age group as well as in different age groups. The importance of the peer group (by exerting norms, modelling smoking behaviour and pressurising youngsters) and self-efficacy expectations was also documented in several studies (De Vries *et al.*, 1988; Conrad *et al.*, 1992; USDHHS, 1994; Kremers *et al.*, 2001a; Holm *et al.*, 2003).

Intention to smoke next year, self-efficacy and perceived behaviour of peers had the highest correlation scores with smoking behaviour. Intention to smoke next year, social influence (especially perceived behaviour of friends and pressure of peers), self-efficacy expectations and alcohol use seem to be the most relevant variables associated with smoking initiation and behaviour in this sample of Portuguese adolescents.

Furthermore, the high correlations between the self-efficacy scales suggest that the differentiation between these constructs may not yet be very distinct in this age group. More research is needed to illuminate whether older adolescents do make this distinction more clearly.

With regard to prevention programming recommendations, the results of the logistic regression suggest that addressing cognitive factors could have an impact on smoking behaviour. This result shows a need for stressing self-efficacy and informing pupils about the various social influences that they might encounter. While attitude was found to be less predictive, the results of the *t*-tests show on which items smokers and nonsmokers might differ. These items should be included in materials and activities aimed at preventing smoking. Discussion of these subjects is needed, also to be able to forewarn nonsmoking students about the arguments that they might hear from their smoking peers. Smoking prevention programmes should also deal with perceived advantages of smoking and indicate alternative ways and behaviours to realize these advantages, namely, to provide skills training on how to socialize with peers and how to manage negative emotions. These strategies could be useful to prevent smoking behaviour and also to improve self-efficacy expectations and to reinforce intention not to smoke. Addressing elements from the social context could also be relevant for smoking prevention. Family (e.g. not allowed to smoke at home and siblings behaviour and social norms) and school (e.g. perceived behaviour of peers) are main elements of the social context.

Finally, the fact that alcohol consumption is related to smoking warrants further study. It is conceivable that the two risk behaviours go hand in hand, that alcohol consumption precedes and/or facilitates smoking, or that smoking youngsters are more likely to engage in alcohol use. This finding suggests that the prevention of these two behaviours should be linked. Longitudinal research is needed to draw better conclusions on this specific relationship.

Our study is subject to limitations. Firstly, the cross-sectional design precludes causal inferences. Secondly, only a limited age range was studied. The strengths of the study are, however, the procedure used to collect data that almost avoided missing cases, the detailed informa-

tion provided on differences between smokers and nonsmokers and on psychosocial factors related to smoking in a sample of Portuguese adolescents and the comparability with other ESFA studies with samples from different European countries (Mudde *et al.*, 1999; Kremers *et al.*, 2001a; De Vries *et al.*, 2003a; Holm *et al.*, 2003). The large amount of items in which smokers and nonsmokers differ and the correlation scores indicate that the model adopted is useful and could be used in future research about Portuguese adolescents smoking behaviour. Further research from the ESFA project could confirm (or falsify) the relationships between variables and smoking behaviour found in this study conducted with baseline data.

What are the implications for Portuguese health professionals? First, Portuguese smoking prevention programmes should include activities aimed to help adolescents to deal with pressure to smoke from peers and to improve self-efficacy expectations to refuse cigarettes. Second, our findings also confirm the link between smoking and alcohol use suggesting that the prevention of these two behaviours should be complementary and may need to address jointly in one programme. Finally, Portuguese health professionals need to put smoking and alcohol prevention on the health agenda of schools and communities in order to develop a climate in which long duration of attention will be given to these topics in schools and communities using evidence-based prevention programmes.

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